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AGAIN BJ LEADS the field with a new designed Weldless Link of forged alloy steel, heat treated. These links have a short upper eye and have been designed for the greatest strength possible. They have full diameter shanks for Link Rated Capacity. The 2¾" links have 3½" plus shank diameter. The 2¼" links have 2⅞" plus shank diameter. **THERE ARE IMITATIONS** of old design BJ Links, but all are shy at the shank diameter or other important sections. This new BJ design was thoroughly tested in the field and was API Rated before any sales were accepted. These Short-Upper-Eye designed links are another first for BJ. All the research, testing, and experience gathered in the last twenty years by BJ are used here again for the good of the Industry.

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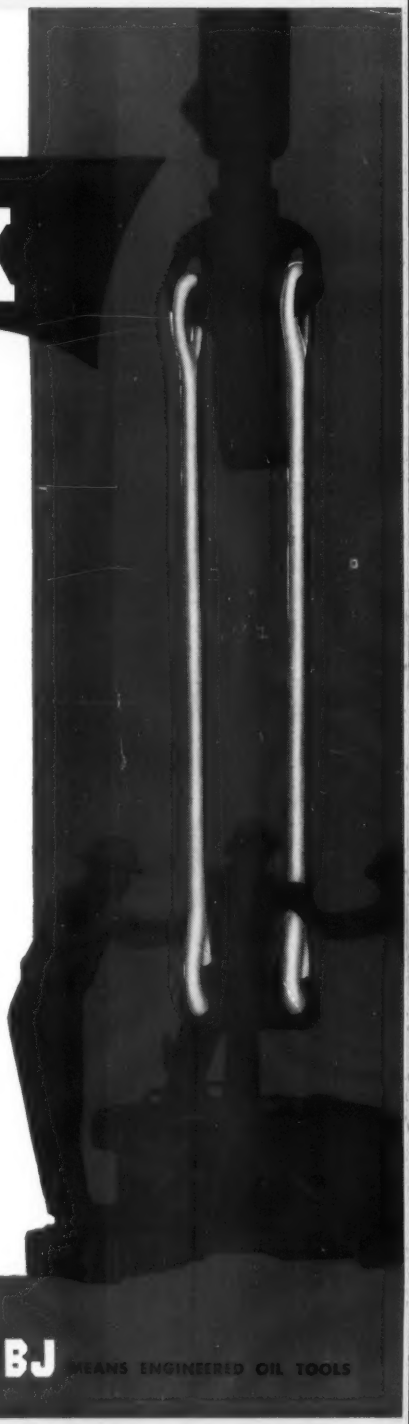
In all popular lengths, including 132". Lengths exceeding these will be made on special order only. Will not be made in 1¾" eye section diameter.



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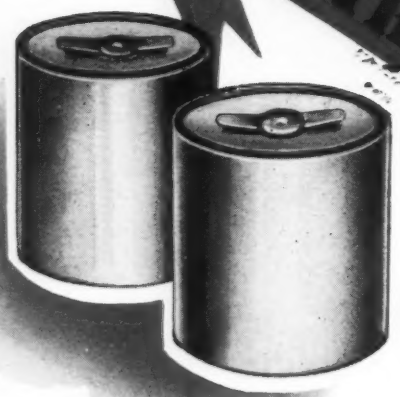

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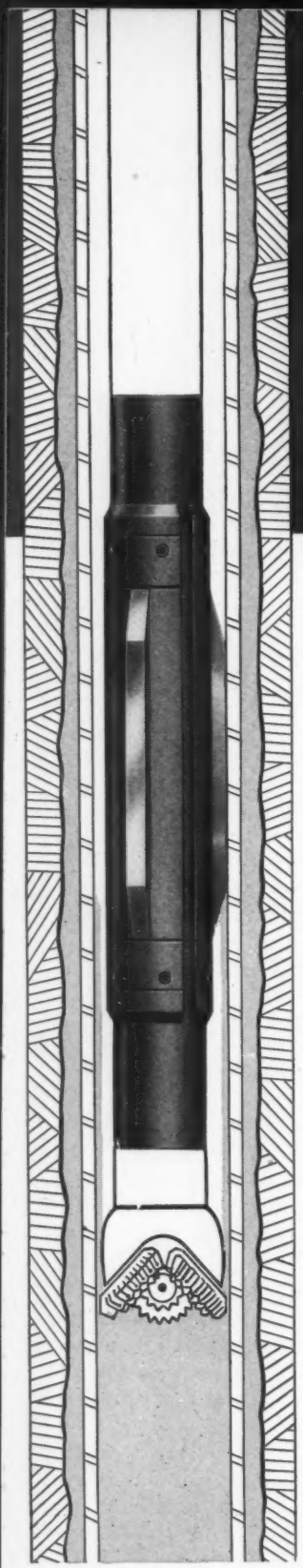

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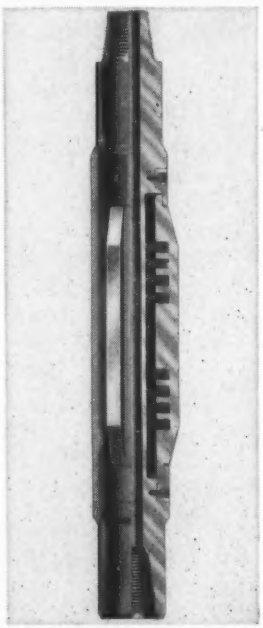
(Product No. 620)



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MAKE SURE CASING IS CLEAN AND SMOOTH—While the equipment is still up, and the crew on hand, scrape casing to leave it in perfect condition for future operations.

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REMOVES SHARP BURRS FROM GUN-SHOT HOLES—The Baker Casing Scraper is strong enough to cut away all such obstructions which interfere with subsequent operations.

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Ending Loose Practices

THE Senator Wherry oil subcommittee of the Senate small business committee which is holding hearings in Chicago can serve the best interests of millions of consumers and the oil industry itself if it will drop politics and conduct an investigation from which comprehensive and constructive conclusions are possible. Up to now the hearings have amounted to nothing more than another smear at the oil business.

Oil shortages in the Middle West, which were frankly predicted and the causes explained by the principal sources of supply going back several months ago, have revealed weaknesses in petroleum's distributing system of long standing. Between the two world wars surpluses rather than shortages were the rule in petroleum supplies, and the disposal of excess output became dominant in this industry's distributing methods.

Thousands of wholesale and retail distributing facilities were built and leased to jobbers and dealers with too little regard as to whether they were needed in the communities they served. With limited gallonage, margins were widened as incentives to increased sales. Those of insufficient business training or ability often were attracted to the distributing end of the oil business because little capital was required of them, profits in effect were guaranteed, and all risks taken by the supplier.

Times have changed. The need for duplicate facilities and constantly widening margins has ended. Inevitably in recent months there has been a tightening in the loose distributing practices extending from the bulk station to the consumer tanks.

The distributor who looks to his supplier to solve every problem that arises will lose business to his competitor who has learned how to buy and sell petroleum products under varying conditions. In a program which stresses volume rather than margins, uneconomic units will be eliminated.

The oil supplier is not obligated to supply something he does not have. Nor do we feel he is required to expand the yields of furnace oils and other refinery cuts sold at low prices in relation to gasoline and a long list of essential products, although there are small and large refining organizations doing just that. But this cannot be continued indefinitely. Either prices for these intermediate products—long considered byproducts—advance to levels justified by supply and demand, or yields will be reduced with a corresponding increase in the production of the lighter and more valuable products. Economic laws cannot long be ignored.

There are other distinctive trends in petroleum marketing. They all add up to the prediction that distribution in petroleum is moving into a period in which efficiency will be comparable to that of the producing, refining, and transportation divisions.

PETROLEUM—A *PROGRESSIVE* INDUSTRY

Transportation, Lack of Crude Cited at Chicago Hearing

LACK of adequate transportation facilities in the North-Central section, coupled with a decline in crude production in the area, again took a major share of the blame for the current tight supply of oil products last week at a 2-day hearing by a Senate subcommittee in Chicago.

The hearing August 21 and 22 was conducted by Sen. Kenneth Wherry. (Rep., Neb.) as chairman of the petroleum subcommittee of the Senate small-business committee. The hearing brought forth charges by independent distributors that they are being squeezed out of business by action of major companies in diverting available supplies to company outlets. This was denied by officials of several major companies who explained the background of the current supply problem.

At the conclusion of the hearing, Wherry issued a statement indicating that the subcommittee hearing will be expanded into a full-scale investigation of the petroleum supply situation. He declared evidence produced into the hearing "indicates to me strongly that there is a definite and progressive process being followed by these major oil companies not only to produce the oil but to distribute it to the consumers." During the hearing, the Nebraska senator said any evidence of "illegality in the direction of monopoly" will be turned over to the Department of Justice with a recommendation for action. He said he was "satisfied that there has been a change in the distribution procedures of the old major companies to get themselves on a vertical level—eliminating the middle man—and this has the effect of hitting the small dealers and independent refineries."

Suggestions Vary Widely

A varied group of suggestions as to remedying the situation was presented. Wherry proposed creation of a group of majors, independent refineries, jobbers and dealers to work out a plan for voluntary allocation of supplies, subject to Department of Justice approval. This, he added, is in line with similar programs under way in newsprint and the steel industries.

Other witnesses generally were concerned with ways to relieve the underlying cause—the undersupply of products. One witness mentioned a possible subsidy to permit operation of refineries not on pipe lines. Another advocated greater use of tank trucks as a transportation measure.

One jobber complaint was that of A. J. Lassus, Fort Wayne, Ind., who said he had lost two-thirds of his supply. He said a Gulf Oil Corp. distributor in Fort Wayne was given 500,000 gal. of fuel oil while his company was being severely curtailed.

The committee attempted to trace this complaint back through the refiner to the source of crude oil. Lassus said he had been told by Leonard Refineries, Inc., Alma, Mich., that his supply would be cut. Reid Brazell, Leonard president, told the committee that his company now had less crude available, except for that being processed with a requirement to return the products to the crude source.

Transportation Blamed

Rush Greenslade, vice president of Gulf Oil Co., Tulsa, said Gulf had offered contracts to Leonard and other refiners to process crude for it, but that no such contract had been made with Leonard. Greenslade said the basic difficulty is the decline in Gulf's Michigan crude production.

One of several witnesses blaming inadequate transportation for the supply problem was B. C. Graves, president of Union Tank Car Co. Graves said Union had ordered 3,500 tank cars since early 1945 but was getting only a small number. He said independents were having as good a a chance to obtain available cars as are majors, based on the company's obligations to its regular customers.

A. A. Stambaugh, vice president, Standard Oil Co. (Ohio), testified his company is producing more than 90,000 bbl. daily but lacked transportation facilities to run refineries at capacity levels.

R. D. Swan, president of Mid-States Refining Co., Falls City, Neb., an independent refiner with a 3,000-bbl. refinery shut down because of inability to obtain crude oil economically, said execessive freight rates on crude oil and products was a basic reason for the lack of products, since it keeps some plants from operating. He offered to sell products to independents at prices about 1 cent a gallon above competitive levels. A subsidy to permit operation of plants not on pipe lines might be a possible solution to alleviate part of the supply situation, he said.

Another witness, C. Austin Sutherland, secretary-manager of National Truck Carriers, Inc., said for-hire truck operators could greatly aid petroleum products transportation if given an opportunity. He said wider use of tank trucks would make available an estimated half of the 7,500 tank cars which the industry is said to need. These trucks, he continued, are operating at barely 50 per cent of capacity, while 24-hour operation is necessary. He suggested some kind of official request to substitute truck movement for tank car.

Policies of Standard Oil Co. (Ind.) in the current supply situation were outlined in a statement by Bruce K. Brown, vice president and director of the company.

The statement anticipated the announcement, made a day after the hearing closed, that Indiana Standard will continue through September and October its present plan of dividing gasoline production among dealers and customers.

Brown's statement pointed to the fact that "the oil industry is now doing a very commendable job in meeting an unprecedented and unanticipated growth in demand for its products."

Another major company, Cities Service Oil Co., said it is altering refinery runs to produce fuel oil at the expense of other and more profitable products. Through its attorney, John King, the company explained it had always found it necessary to buy fuel oil from outside sources and that its inability to make these purchases in normal quantities has resulted in its shortage. The company said it was distributing supplies equitably and denied any program or agreement with any other person or company detrimental to interests of independents.

Dealers Voice Complaint

One of the strongest complaints at the hearing came from the Independent Fuel Oil Dealers Association of Chicago. Baxter Ostergren, business agent for the association, declared "major oil companies are out to eliminate us from the fuel-oil field and are taking advantage of the monopoly of diminishing supplies as a means of so doing." He presented 41 affidavits on supply curtailments, particularly No. 3 fuel oil.

In Washington, it was disclosed that hearings conducted by another Senate group, the public-lands oil resources committee will be resumed during the congressional recess. A spokesman for Sen. George W. Malone (Rep., Nev.), said the first of the recess investigations will be conducted in Denver and that members of the Rocky Mountain Oil and Gas Association who did not have the opportunity to appear at the March hearings in Washington, will outline problems of petroleum operations in that area. It was emphasized that the Malone committee will leave to the small-business subcommittee those problems dealing with the relationship of independents and majors.

September Allowable Provides New High in Texas Production

THE Texas Railroad Commission has increased the daily average allowable for September by leaving the general number of producing days at 27 for the 30-day month in an order designed to allow an all-time record daily net production of 2,341,526 bbl. of crude oil. The total represents an increase of 29,691 bbl. daily over the present daily production of 2,306,050 bbl. The total September allowable was set at 2,534,393 bbl. daily but underproduction was estimated at 7.61 per cent.

The estimated actual production of 2,341,526 bbl. daily is 51,526 bbl. over the U. S. Bureau of Mines' September estimate of demand, of 2,290,000 bbl. Natural gasoline and distillates were estimated at 192,867 bbl. daily. The commission granted operators' requests to reduce allowables in the Griffin and Avoca fields of West Central Texas and South Esperson Dome field on the Gulf Coast, because of water encroachment. Fields granted increases include La Gloria, Jim Wells and Brooks counties; Walnut Bend, Cooke County, and Oyster Bayou, Chambers County.

Gas-Demand Increase

The commission reported an increase in gas demand for September of 138,380,000 cu. ft. daily over the August demand. Daily average demand was said to be 5,237,794,000 cu. ft. for sweet gas, and 808,357,000 cu. ft. for sour gas, or a total of 6,046,151,000 cu. ft. daily in September.

Chairman E. O. Thompson said the commission would retain district offices at San Angelo and San Antonio, although staffs at both places will be curtailed after September because of reduced appropriations. Next statewide hearing was set for September 17 at Austin.

In the week ended August 16, the production of crude oil in the United States set an all-time record with an average daily output of 5,165,175 bbl. which was 41,880 bbl. daily greater than the previous record set during the week ended June 21.

If the daily average allowable set for Texas in September reaches its intended mark of 2,341,626 bbl. and other states remain unchanged, Texas will be producing more than 49 per cent of the nation's total daily crude oil output. The present daily production of Texas of 2,306,050 bbl. represents nearly 45 per cent of the country's production.

TEXAS ALLOWABLES BY DISTRICTS

(Figures in barrels daily)

	September	August 16
Southwest Texas:		
District 1	25,486	25,237
District 2	172,715	170,648
District 4	262,899	259,684
Gulf Coast:		
District 3	547,805	536,516
East Texas:		
District 5	43,122	42,068
District 6	122,993	120,759
East Texas field	321,619	325,893
West Texas:		
District 8	684,582	672,508
District 7-C	43,798	42,955
Panhandle:		
District 10	99,572	99,498
North Texas:		
District 9	162,521	161,917
West Central Texas:		
District 7-B	47,281	47,019
Total	2,534,393	2,504,702

New Highs Reached in Completions and Footage

PREVIOUS records of activity in various branches of the oil industry are continuing to fall under the pressure of the greatest demand for crude oil and products in the nation's history. Two more new records came to light this week when July completions showed footage drilled and well completions exceeded all earlier monthly totals.

Total completions numbered 3,387, an increase of 219 over the previous record set just 10 years ago. The next highest previous record for monthly completions was in July 1941 with a high of 3,165.

The record footage drilled during July 1947 was 11,762,389 ft. which exceeded the previous high in May 1947 by 1,770,831 ft. Only eight times since 1941 has the monthly record reached 9,000,000 ft. or more.

A new all-time high for crude-oil production for the state of Louisiana was set during the week ended August 23 with a total of 437,050 bbl., an increase of 950 bbl. over the previous week. Mississippi was up 1,550 bbl. to 99,905 bbl., nearing its all-time record of 99,955 bbl. the week ended August 9.

Humble Steps Up Tank-Car Shipments from West Texas

Humble Pipe Line Co. began movement of an additional 10,000 bbl. daily from its new double loading rack on the Santa Fe railway at McCamey, Tex., early this week, upon completion of the second siding of the rack. This new loading capacity will increase Humble's daily shipments to about 45,000 bbl. of crude oil, at approximately 200 bbl. to the car, from Midland over the Texas & Pacific Railroad, according to J. W. Thomas, Humble Pipe Line division superintendent at Midland.

Permian Basin crude is brought to the rack by a recently-laid 10-in. pipe line from Humble's McCamey tank farm. A new pump station is scheduled to be erected to handle the additional capacity of the loading rack. A tie-in with Gulf Refining Co.'s pipe line east of McCamey will be made at an early date.

Truck Drivers in Chicago, Texas Drillers on Strike

Strikes affecting drilling operations in Texas and petroleum transportation in Chicago are under way in the oil industry.

Early this week, violence broke out in a walkout of a reported 1,400 drillers and roughnecks in the South Texas area from Victoria south to Hebronville and Corpus Christi. A group of men attacked the crew of a rig, and later a jackknife rig was overturned near Clarkwood.

In Chicago, the strike of A. F. of L. truck drivers remained unsettled. The U. S. Conciliation Service sought a solution to the dispute in meetings between leading Chicago area truckers who are contract petroleum product carriers, and representatives of the union.

30,000-Ton Tanker Reported Planned

Construction of a 30,000-dwt. tanker, with a carrying capacity of 240,000 bbl., is slated to get under way soon, according to reports from National Bulk Carriers, owners of the Ulysses, a 27,900-dwt. tanker and the largest to date.

The keel will be laid at the J. K. Welding Yards, Norfolk, Va. Several other firms reportedly are considering construction of giant tankers of approximately this size.

The Ulysses is 852 ft., 6 in. in length with a beam of 86 ft. 9 in. Cruising speed is 16 knots. Capacity is approximately 200,000 bbl.

Shell Group Gets Award

Fifteen employes of Shell Pipe Line Corp.'s Austin (Tex.) division were presented with the Holmes Award for Safety August 22, at the division's annual picnic at Cristoval, Tex. Robert Bradford, U. S. Bureau of Mines representative from McAlester, Okla., made the presentation to P. J. Williams, division superintendent. The Austin division had compiled a record total of 455,127 man-hours worked, over a period of 846 consecutive days without a single lost-time accident.

Grand Jury Investigating Gasoline Prices in Washington

WASHINGTON.—Prices of gasoline and other petroleum products in Washington and the adjacent area are being investigated by a federal grand jury here under direction of the Department of Justice, and subpenas have been issued to retail gasoline dealers and officials of all major companies marketing in the area.

The investigation is said to be similar to that now in progress in Los Angeles and to be aimed at charges of collusive action in restraining competition by uniform price changes.

Standard Oil Co. of New Jersey issued a statement in New York declaring its readiness to give the jury complete data on its pricing methods. The company said: "The local sales manager for our company in Washington has been asked to appear before a district grand jury and certain of our records have been subpenaed.

"It is our understanding that the grand jury is inquiring into the subject of gasoline prices but we have no idea what information it is trying to develop.

"The policy of the Standard Oil Co. of New Jersey has been and is today, to keep prices of petroleum products as low as possible. In this period of inflationary pressure, we have tried to hold prices down, and we will, of course, be glad to give the District of Columbia grand jury or any other official body complete data on what we have done in this regard or on any other subject concerning which they may wish to inquire."

In a letter filed with the clerk of the District of Columbia court, Tom Clark, U. S. attorney general, said the Department of Justice had information that certain petroleum companies doing business in Washington "have violated the antitrust laws."

Another grand jury in the capital is conducting an inquiry into real-estate dealings. The two investigations follow the Department of Justice's announced plan to watch cost-of-living items for evidence of antitrust violations. Clark has announced the department will seek jail sentences for any persons found guilty of collusion.

The investigation of motor-fuel distribution and sales in Pacific Mountain states was disclosed several weeks ago. A Justice Department official said this study "has not reached the grand-jury stage."

Synthesis Plants to Provide Chemical Source

PRODUCTION of a number of chemicals in two Fischer-Tropsch plants to be built in Texas and Kansas will provide a dependable new source of these much-needed products at prices competitive with those from any other synthesis or fermentation process.

This comment was made in an announcement confirming that a long-term contract has been reached between U. S. Industrial Chemicals, Inc., and Stanolind Oil & Gas Co. for the sale by U.S.I. of all water-soluble oxygenated chemicals to be procured at the two plants (The Oil and Gas Journal, August 23, page 141). The plants are being undertaken by Stanolind and Carthage Hydrocol Corp. Plans call for erection of U. S. I. plants at the two locations for production of other products using some of the Fischer-Tropsch chemicals as raw materials.

It is estimated the chemicals produced from these Fischer-Tropsch plants may exceed a total of 300,000,000 lb. annually, and include ethyl alcohol, methyl alcohol, normal propyl alcohol, normal butyl alcohol, normal amyl alcohol, acetone, methyl ethyl ketone, acetic acid, propionic acid, butyric acid, acetaldehyde, propionaldehyde, and butyraldehyde. In addition, U. S. I. will produce esters, higher alcohols, and other chemicals from some of the primary products, adding substantially to the number of products made available by this development.

The plants will open new fields by making available for the first time large quantities of such products as normal propyl alcohol, normal amyl alcohol, propionic acid, and butyric acid, and will stimulate development of new solvents, plasticizers, pharmaceuticals, plastics, and numerous other chemical products.

The announcement said it is important to note all of the alcohols, acids, ketones, and aldehydes produced by this new process are normal compounds. These normal compounds are generally preferred, but heretofore only the lower members of the series have been available in quantity at reasonable prices.

June Exports, Imports Of Crude Show Drop

Exports of crude oil during June averaged 125,266 bbl. daily, a decrease of 29,218 bbl. daily from May, while June imports averaged 261,866 bbl. daily, a slight drop from the 270,000-bbl. figure for May.

Exports of gasoline and motor fuel oil for June were 113,700 bbl. daily, an increase over the previous month of 18,958 bbl. daily while imports for June showed a decrease of 64,506 bbl. daily compared with May. Total for June was 122,333 bbl. daily.

Lubricating oil exports for June were 44,600 bbl. daily as compared to 43,903 bbl. daily for May. Exports for June of last year amounted to 35,133 bbl. daily.

Explosives Control Ended

ONE more wartime control which bothered the oil industry disappeared when the federal Explosives Act was wiped off the books along with a lot of other obsolete legislation.

First enacted in 1917, the explosives-control law was inactive between World Wars I and II, but automatically came back into force the day after Pearl Harbor. Under it the Bureau of Mines required all handlers of explosives to have licenses, including seismograph crews and oil-well drillers. The primary purpose of the act was to prevent sabotage, but it also promoted safety in storage and transportation of industrial explosives. More than 800,000 licenses were issued and 25,000 storage magazines inspected, but there was not a single case of sabotage involving blasting materials.

The only remaining federal controls over explosives are the permanent transportation regulations of the Interstate Commerce Commission.

Average Octane Last Winter Reported at 75

American gasolines have maintained a high standard of quality as indicated by octane ratings, regardless of the unprecedented demand for petroleum products, the Bureau of Mines has reported.

Last winter regular gasoline averaged an octane rating of 75 as compared to a rating of 74.4 the previous summer, while premium gasoline averaged 78.5 and 78.3 respectively, for the same periods, the bureau said.

Oil Workers Adopt New Policy

A 24-member policy committee of the Oil Workers International Union (C.I.O.) in Kansas City last week adopted unanimously a three-point program calling for wage improvements, intensive membership drive, and full support of the Political Action Committee of the C.I.O. with emphasis on repeal of the Taft-Hartley law and the defeat of all congressmen who voted for it.

this week

REFINING—Army-Navy Petroleum Board, WAA reach agreement under which remaining government-owned 100-octane plants will be sold with preference to bidders promising to fill military contracts for aviation gasoline. . . . Procedure to be followed in disposal of four plants now up for sale—two at Texas City, one at Catlettsburg, Ky., and one at Norwalk, Calif. . . . ¶Bureau of Mines reports on survey of motor-fuel octane last winter. . . . Says average rating of regular advanced from 74.4 to 75 while premium was up from 78.3 to 78.5. . . .

PRICES—Federal grand jury in Washington launches investigation into gasoline prices in the capital and vicinity. . . . Retailers and major-company officials subpenaed, along with records. . . . Investigation said to be similar to that now under way in the Pacific-Rocky Mountain area. . . . ¶Products markets continue tight with suppliers looking toward building stocks for expected record fuel-oil demand this winter. . . . ¶Twenty-five-cent boost announced for price for Corning grade crude. . . . New price now $2.60. . . .

INTERNATIONAL—Venezuelan Government receives eight bids in public offering of about 35,000,000 bbl. of royalty oil over 2-year period beginning next January. . . . Bids cover some 19,000,000 bbl. and include two from United States, Dale W. Moore, Texas brokerage firm, and Petroleum Terminal Corp. of Maryland. . . .

TRANSPORTATION—RFC Chairman John D. Goodloe commends operators of Big Inch lines in officially terminating construction and operating agreement. . . . In letter to W. Alton Jones, Cities Service president who headed War Emergency Pipelines, Inc., Goodloe says net return to Government approximated $182,000,000 exclusive of depreciation, against a government capital investment of $145,000,000. . . . ¶Giant tanker of 30,000-dwt. and carrying capacity of 240,000 bbl. reported planned for construction by National Bulk Carriers. . . . Mid-Continent Petroleum discloses plans to modernize southern Oklahoma pipe-line system at cost of $1,000,000. . . .

RECORDS—Texas Railroad Commission fixes largest allowable in state's history for September. . . . Production under order expected to average 2,341,526 bbl. daily. . . . ¶Production figures for week ended August 23 shows Louisiana at new high with 437,050 bbl. daily. . . . ¶July figures reveal new records in total well completions and footage drilled. . . . Completions reported at 3,387—219 over previous high 10 years ago. . . . Footage totaled 11,762,389 ft., up 1,770,831 ft. over previous record last May.

EXPLORATION—Pure well in Dollar Hide pool, southwest Andrews County, Texas, flows 50 to 75 bbl. oil per hour from Ellenburger at 9,980-10,033 ft. . . . ¶Quintana Petroleum opens gas-condensate pool, Calhoun County, Texas, producing at 7,920-41 ft. . . . ¶Pool opener in Beauregard Parish, Louisiana, flows 130 bbl. oil per day from perforations at 6,498-6,506 ft. . . . ¶Gas-condensate pool opened in Jasper County, Mississippi, with well gaging 31,000,000 cu. ft. . . . ¶Leduc field extended 1 mile northwest by Globe-Leduc West 2. . . . ¶Warren Oil appears to have Wilcox discovery in Noble County, Oklahoma. . . .

Officials of the newly formed American Independent Oil Co. greet foreign visitors at Bartlesville's Municipal Airport. Phillips Petroleum Co. along with ten other independents have organized this new company and will bid for operating rights in the neutral zone of the Near East located between Saudi Arabia and Kuwait on the Persian gulf and also carry out other foreign developments. In the group are: George Wakim, official interpreter; K. S. Adams, president Phillips Petroleum Co. and newly elected vice president of American Independent Oil Co.; R. C. Jopling, vice president, public relations department, Phillips Petroleum Co.; His Excellency, Muhammad al-Amri, son of the prime minister of Yemen; Hasan Baghdabi Bey, adviser; Hussein Abdulla, adviser; His Royal Highness, Saif al Islam Abdulla, Prince Abdulla; Ralph K. Davies, president of American Independent Oil Co.; Frank Phillips, chairman, Phillips Petroleum Co. and director of American Independent Oil Co.; and Dr. Adnan Tarcici, adviser (For details on the American Independent Oil Co., see story, page 44)

West Edmond Unit Plan to Begin Operations October 1

UNIT operation of the 30,000-acre West Edmond, Oklahoma, Hunton lime oil pool to begin October 1 will be the first field ever unitized by compulsory communization of all lease and royalty interests. Such operation is authorized by a 1945 Oklahoma statue, the first law of its kind in any oil producing state.

The new operating unit was set up at a conference of 92 per cent of the leaseholders last week when Earl D. Wallace, vice president in charge of production for the Sohio Petroleum Co., was elected chairman, and Weston T. Payne, vice president of Anderson-Prichard Oil Co., was elected vice chairman. Harold N. Pardee, who retired last November from The Texas Co., was elected unit manager.

In the corporation commission hearing, Gulf Oil Corp., British American Oil Producing Co., and Denver Producing & Refining Co. and H. H. Wegener, as operators, and some 108 royalty owners opposed the unit program. The Denver company and Wegener have sold their properties since the case started, and Gulf and British American have announced that they would not appeal the commission's order.

The following executive committee of eight members was selected for the West Edmond Hunton Lime Unit: W. H. Atkinson, consulting geologist and independent operator; Walter E. Stagmeier, of Fox & Fox, Inc.; C. P. Dimit, vice president of Phillips Petroleum Co.; C. C. Peppers, head of Peppers Refining Co.; T. L. Regan, division superintendent of Stanolind Oil & Gas Co.; Ed Downing, assistant general superintendent of Magnolia Petroleum Co., Dallas; Wallace, and Payne.

Operation of Plan

The first step in the unit operation of the field will be to shut in the wells with high gas-oil ratios, and produce the allowed amount of oil from other wells. The present allowable of 40,000 bbl. daily is expected to be kept through the first 2 months of operation. Since some high gas-oil areas have been created in several parts of the field, it is estimated that some 200 wells will be closed early in October. To determine the effect of repressuring caused by the closed wells, bottom-hole pressure surveys will be made at intervals.

Pilot tests will then be made throughout the field for gas injection. After the pilot tests the natural gas produced with the oil will be injected back into the reservoir.

The unit operators hope to increase the allowable to 50,000 bbl. or more daily by the end of the year.

Natural gas will be gathered and handled through two large plants already established. One, the Peppers Refining plant, has been purchased by the Phillips Petroleum Co., Sohio Petroleum Co., and Stanolind Oil & Gas Co. However, Wallace announced that other members of the unit would be permitted to purchase an interest at the same price and to become common partners.

The second plant is the Continental Oil Co. and Phillips plant located in the old Edmond field. This one was not acquired by the unit.

Cities Service Gas Co. and Oklahoma Natural Gas Co. are at the present serving the field with pipe lines, taking residue gas from the two plants.

Injection of water after the gas injection has reached its effectiveness will produce an additional 30,000,000 bbl. of oil from the field, according to Don Knowlton, consulting engineer.

The gas vented daily has reached an estimated 250,000,000 ft. and has caused a great loss of income and pressure in the oil zone. Some of the wells in Kingfisher and Logan County sectors have never been connected to a gas line because of lack of market for the natural fuel.

Sohio Petroleum Co., one of the first operators in the field and owning 114 producers in the Hunton zone, has been selected as the unit operator. There are an estimated 2,800 landowner and royalty owners and 32 operating interests.

Cooperation Needed To Halt Tax Evasion

Increased cooperation between industry and state governments will aid materially in reducing attempts of shippers to evade state motor fuel taxes, Frank V. Martinek, vice president of Standard Oil Co. of Indiana and chairman of the Central Gasoline Tax Evasion Committee, declared before the Northwest Central States Gasoline Tax Administrators Conference, held August 21-22 in Duluth, Minn.

Martin estimated that 350,000,000 gal. of gasoline and other products, equal to the capacity of a "solid train of railroad tank cars 212 miles long," are carried up the Mississippi River every week, and declared there is an "inadequacy of present reporting methods" and a "need for controls" over such movements.

To combat state tax evasion, Martinek recommended: increased cooperation between states and industry; more complete exchange of information; studies of inland waterway problems and formulated plans for control of water-borne imports; prevention of fraudulent refunds; prevention of "chiseling and incipient evasion;" competent staffs of tax administrators; regular and thorough audits of licensed distributors; moderate tax rates; action to make certain everyone pays his just obligations to the state.

1,000,000 Acres to Be Leased by Government

One million acres of public lands in the Jackson Hole area of northwestern Wyoming in the Teton National Forest will be opened for restricted oil and gas exploration by the Department of the Interior.

Department officials said the order "will make possible the tapping of additional oil supplies at a time when the armed forces are critically short of minimum requirements of petroleum products."

Drilling will be permitted only on lands within an approved unit development plan, and all leases and unit plans must acknowledge control by the secretary of the interior or his representatives regarding the prospecting and development, spacing of wells, and unnecessary road construction, and any other operations which might destroy the forest lands, the announcement said.

Areas will not be approved unless the Geological Survey reports that oil or gas development is in the best interests of the United States, and also that the structural conditions are such as to warrant the belief that the lands may contain oil or gas.

Deepest Wildcat Test In Texas Abandoned

Texas' deepest wildcat, The Texas Co. 6 Yturria, 8 miles northeast of Raymondville in Willacy County, has been abandoned at 16,006 ft.

Since April the drilling crew has been attempting to recover drill collars and drill pipe lost in the hole. The original plans were to carry the well to a depth of 16,500 ft. No production tests were made.

Navajo Leases Bring $153,316

Cash bonus bids of $153,316 were received by the Navajo Central Agency for oil leases on 16,187 acres of land in the 15,000,000-acre Navajo Indian reservation.

Military-Supply Commitment Sought in Avgas Plant Sales

WASHINGTON. — Remaining Government-owned 100-octane plants will be sold with preference to bidders promising to fill Army and Navy contracts for aviation gasoline, under the terms of an agreement announced by War Assets Administration and the Army-Navy Petroleum Board.

The board wrote WAA that it is having difficulty obtaining supplies of aviation gasoline at the same time that the Government is attempting to dispose of 100-octane plants built specifically to supply the Government with this product, and requested that WAA ask for bids with a tiein provision requiring the purchaser to produce aviation gasoline for the armed forces. It also stated that several prospective purchasers have approached the board with proposals to enter supply contracts if they are successful in purchasing the plants.

While agreeing to give preferential consideration to bids recommended by ANPB, the WAA announcement did not indicate how much of a price differential, if any, would be allowed to such bidders.

Would Benefit Purchasers

The Army-Navy Petroleum Board, which said its request to WAA carried the concurrence of the secretary of the navy and the secretary of war, said the procedure not only would benefit the armed services in obtaining additional products, but will insure prospective purchasers of the surplus facilities of an outlet for their products.

WAA Administrator Robert M. Littlejohn in acceding to the ANPB appeal declared:

"Since petroleum products are so vitally needed for the armed forces, and since this is a matter involved in the national defense, it is desired that whole-hearted cooperation be given in the matter. It has been directed, therefore, that appropriate steps be taken to comply with the request."

Henceforth, WAA said, ANPB will be permitted to submit its recommendations on proposed awards and contracts involving disposition of surplus petroleum-refinery facilities prior to review by the WAA real-property review board of bids made on surplus refineries.

Currently WAA is offering for disposal four surplus refineries. They are:

A refinery at Catlettsburg, Ky., built by the Government at a cost of $16,500,000 with processing facilities capable of accommodating 10,000 bbl. of gas oil a day; two refineries at Texas City, Tex.—one built by the Government at a cost of $11,234,000 with a 12,000 bbl. a day processing capacity and another constructed at a cost of $11,543,000 with a 13,000 bbl. per day capacity, and an $8,561,000 refinery at Norwalk, Calif., with processing facilities for 4,000 bbl. a day.

25-Cent Increase Posted For Corning Grade Crude

The Joseph Seep purchasing agency of South Penn Oil Co., announced August 25 a 25-cent increase per barrel in its price for Corning grade crude oil in Buckeye pipe line.

The new price of Corning grade now is $2.60. On November 16, 1946, the posted price was $1.76, since then, Corning has been increased 84 cents or nearly 50 per cent.

There was no indication that the Corning crude boost would bring similar increases in the prices of the various grades of Pennsylvania oil. The August 25 increase was the first for Corning since March when that grade of oil was hiked 25 cents. Since March, several increases have been made in the posted prices of Pennsylvania Grade crudes.

1946 Transportation Expenditures High

Capital expenditures for the oil industry's crude-oil and products transportation facilities more than doubled during 1946, first complete year of the industry's post-war operations.

Thirty companies representing two-thirds of the industry's total investments in the country increased transportation expenditures from $75,000,000 in 1945 to $157,000,000 in 1946, according to an analysis of operations of these 30 companies published this month. The analysis was compiled by Joseph E. Pogue, vice president of the Chase National Bank, New York, and Frederick G. Coqueron, member of the bank's petroleum department.

The study estimated that the entire industry, based on the 30-company analysis, spent $175,000,000, or 10.8 per cent of the total capital expenditures, on transportation facilities.

Heavy increases in expenditures also were shown for refining and marketing facilities.

The analysis showed refining expenditures of the 30 companies increased from $122,000,000 in 1945 to $201,000,000 in 1946, and estimated the entire industry spent $208,000,000, or 12.8 per cent of total capital expenditures.

Marketing expenditures for the 30 companies were up from $75,000,000 to $185,000,000 in 1946, and for the entire industry figured 13.4 per cent of the total capital expenditures.

The study estimated that the whole industry spent $1,040,000,000, or 63.9 per cent, for production facilities. Total capital expenditures for all purposes were estimated at $1,627,000,000.

Industry Group Gets Big Inch Commendation

MILLIONS of dollars accrued to the federal Government from one wartime activity, at least, the Big Inch and Little Big Inch pipe lines. At the same time consumers profited by a saving in transportation cost of $290,000,000 in the period from January 1943 through October 1945.

Chairman John D. Goodloe, of the Reconstruction Finance Corp., in officially terminating construction and operating agreements, revealed these facts in a letter "of commendation and appreciation," to W. Alton Jones, president of Cities Service Co., who headed up War Emergency Pipelines, Inc., which built and operated the Big and Little Big Inch.

"From both military and economic standpoints, the lines more than met expectations," wrote Mr. Goodloe. The net return to the Government was approximately $182,000,000 exclusive of depreciation. This compares with a Government capital investment of $145,000,000, which is substantially the sum for which the system was recently sold. The government also effected a heavy saving in oil transportation directly resulting from the $290,000,000 difference in the costs for pipe-line deliveries and the more expensive charges which would have been necessary for tank car deliveries provided tank cars could have done the job."

Wegener Sells West Edmond Field Interests

H. H. Wegener, drilling contractor and independent operator, last week sold his producing properties in the four-county West Edmond oil field to the West Edmond Oil Co. for $2,425,000.

Included in the sale of 6 leases were 15 wells, all of which were making their allowables of 81 bbl. daily.

West Edmond Oil Co. is a new corporation with listed paid in capital of $1,872,000.

XUM

International

WORLD-WIDE OIL DEVELOPMENTS

Independent Company Seeks Grant In Neutral Zone, Yemen

WITH the official announcement concerning the organization of the American Independent Oil Co., additional speculation has arisen in foreign oil circles as to the available oil concession areas in the Middle East. The Kuwait Nejd neutral zone, which lies south of Kuwait and borders on this sheikdom and Saudi Arabia, has been the area most commonly discussed.

However, little has been said to date about the possibility, or probability, of A.I.O.C. (the initials conflicting with those of the Anglo-Iranian Oil Co., Ltd.) obtaining a concession in Saudi Arabia proper. While the Arabian American Oil Co. holds one large concession there and has preferential rights on another extensive Saudi Arabian area, it is a good bet that the American Independents are aware of the fact that Aramco may have to surrender part of its concession in the near future—at which time King Ibn Saud, who needs additional sums of money for the economic development of his country, might be persuaded to give the independents a concession within the area surrendered by Aramco.

"Dutch Auction"

Reports from well-informed Middle East oil circles indicate that the sheikh of Kuwait is holding a "Dutch auction" over preferential rights for 50 per cent of the Kuwait Nejd neutral zone. Armaco holds preferential rights over the 50 per cent controlled by King Saud. In this discussion over the equally divided rights in this area it is interesting to note that King Saud and the sheikh of Kuwait each apparently view their 50 per cent as a half interest in what might be developed anywhere in the area and not merely a 50 per cent interest over some equally divided area within that zone. As a matter of fact, boundaries are still unsettled.

Thus, it would appear that if the American independent group obtain a 50 per cent interest from the sheikh of Kuwait that they might either enter into some type of partnership arrangement with Aramco or at least hold a concession with Aramco having some share in the venture. It appears certain that Aramco will not object to entry of the independents, and in fact may welcome this enterprise. A possible barrier to independents joining forces with Aramco here is that other companies are bidding for Kuwait's undeclared 50 per cent interest in the Kuwait neutral zone. About the only certainty is that this area probably will be developed, but by whom—aside from Aramco—is not yet evident.

Red Line Status

Iraq Petroleum Co., Ltd., and Gulf Oil Corp., the latter a joint owner of Kuwait Oil Co. with Anglo-Iranian Oil Co., Ltd., reportedly have submitted bids on the Kuwait neutral zone. Shell interests also have shown a keen interest in the neutral zone.

Assuming that C. S. Gulbenkian, the 5 per cent partner in Iraq Petroleum Co., Ltd., is persuaded to sign the new group agreement—which would once and for all nullify all discussions over the status of the famed "Red Line Agreement"—it appears certain that other I. P. C. partners, acting on their own, will show a greater interest in Middle East areas which formerly were prohibitive because of the existence of the restrictive agreement. While Kuwait itself is outside the Red Line, the Kuwait Nejd neutral zone is within. And presumably this has been at least a partial barrier to certain I.P.C. partners openly bidding for Kuwait's 50 per cent share.

Negotiations with Gulbenkian are still in progress, with indications that the minority I.P.C. partner may soon agree to the new and generous terms by signing the new agreement. As matters stand, Gulbenkian will profit by approximately $5,000,000 yearly under the newly proposed terms.

Reports from officials of the American Independent Oil Co. indicate that certain representatives will leave for the Middle East within a few weeks, possibly to establish headquarters in Cairo or elsewhere and to conduct negotiations directly with certain Middle East governments.

A spokesman for American Independent said that Phillips Petroleum had technicians in the Near East neutral zone at this time engaged in a study of the area. Any acquisition obtained by Phillips will be assigned to the new company, he added.

Directors

Of the directors on the Independents' board, four are from Phillips Petroleum Co. They are: Frank Phillips, board chairman; K. S. Adams, president; Don Emery, vice president and general counsel; and Paul Endacott, vice president and assistant to the president. Three companies have two men each on the board. Honolulu Oil Co. has its president, A. C. Mattei, and a vice president, L. A. Cranson. Hancock Oil Co. of California has Will J. Reid, its president, and John W. Hancock, assistant to the vice president. Globe Oil & Refining Co. has its president, I. A. O'Shaughnessy, and a vice president, Russell H. Green. Others on the board of directors and their company affiliations are: Ralph K. Davies, American Independent president, who was wartime deputy administrator of the Petroleum Administration for War and formerly a vice president of Standard Oil Co. of California; C. H. Wright, president of Sunray Oil Corp.; J. Howard Marshall, president of Ashland Oil & Refining Co. and wartime chief counsel of PAW; Sam B. Mosher, president of Signal Oil & Gas Co.; W. W. Vandeveer, board chairman of Allied Oil Co.; Jack Blalock, a director of Premier Oil Refining Co.; Vernon Barrett, Los Nietos Producing & Refining Co.; and J. S. Abercrombie, Texas independent producer, among whose activities include the Abercrombie & Harrison Oil Co. and operations with Magnolia Petroleum Co. at Old Ocean, Tex.

Other Middle East areas where American Independent might obtain

oil concessions, include the Kingdom of Yemen, whose crown prince last week was being escorted on a tour in the Southwest by Phillips Petroleum officials, as well as Asir and Hedjaz, all of which border the Red Sea. Iraq Petroleum Co., Ltd., surrendered concessions on Asir and Hedjaz, and geologists of some major companies reportedly have stated that Yemen appears unlikely to yield oil.

However, other reports are that oil seepages have been seen on the Farasan Islands, northeast of Yemen in the Red Sea. A test was drilled there some years ago but proved to be a dry hole. Southern Iran, adjacent to Anglo-Iranian's oil concession, should not be ruled out as a possible area which the independents may invade.

The Yemenian delegation *(for a picture of the group, see page 41)* returned to New York following the three-state tour of properties in the Southwest owned by the group comprising American Independent. The delegation is to remain in New York until the conclusion of the United Nations conference now under way.

In an interview during the tour, the Yemen prince, through his secretary, said "it is not true that any lease has been given as yet to any oil company but Yemen is quite prepared to come to an agreement with any company that is ready to give the best and most suitable conditions to Yemen." A decision will be made soon as to whom to grant a concession and all offers will be studied in the meantime with the help of advisers, it was said.

Venezuela Receives Eight Bids for Royalty Crude

TO obtain additional revenue, the Venezuelan Government may call for additional bids on more of its royalty oil, according to Venezuela's minister of fomento Juan Pablo Perez Alfonso, who has made an official statement in Caracas explaining his government's reasons for previously seeking bids on approximately 50,000 bbl. of its 200,000 bbl. daily of royalty crude.

Eight oil companies in six foreign countries submitted bids on the original offer. The bids which were opened in Venezuela last week.

Bids covered about 19,000,000 bbl. The crude offered averages about 1,484,000 bbl. monthly, or a total of about 35,000,000 bbl. over the 2-year period.

The bids were taken under consideration, and officials said a decision would be announced later.

Dale W. Moore, Inc., Texas brokerage firm, bid on 1,940,000 bbl., and Dr. Matienzo, of Caracas, placed a bid for 1,265,000 bbl. for Petroleum Terminal Corp. of Maryland.

Other bidders, representing five other countries, included: Compania Brazileira de Petroleo, Rio Grande, Brazil, 1,390,000 bbl.; Refineria Belga de Petroleo, S.A., Amberes, Belgium, 700,000 bbl.; S. A. Permolio, Rome, Italy, about 1,120,000 bbl.; Martin Seins, Portugal, about 4,521,000 bbl.; Refinazao de Petroleo, Portugal, about 7,912,000 bbl.; and Ancap, Uruguay, about 106,750 bbl.

In his statement, Perez Alfonso frankly admitted that the government was taking advantage of the current tight crude-oil market, a privilege the government has as it can either take cash or the crude oil itself. Previously the companies operating in Venezuela had been buying the royalty oil and still are to the greatest extent.

Income from Venezuelan oil operations this year will reach the record figure of 750,000,000 bolivars (roughly $250,000,000), according to the minister of fomento. Oil's future in Venezuela was never more promising, he said, due to recent Cretaceous discoveries.

Two principal objectives motivated the government to seek bids on the original one-fourth of the royalty oil, or approximately 50,000 bbl. daily, Perez Alfonso explained. First, he said, the government wished to determine whether the price offered was comparable to what the companies were paying; and secondly, the government wished to obtain the highest possible price for its royalty oil. Regarding the second objective, he explained that there is no intention of forcing artificial prices on the operating companies but that the government was anxious to realize the maximum on its royalty crude at a time when world demand for crude oil was so great and prices consequently higher.

Pravada Says That Iran Takes "Dangerous Course"

When the Iranian Government recently indicated it intended to break the 1946 agreement for the establishment of a Russian-Iranian oil company in northern Iran, the Communist newspaper, Pravada, said it was pursuing a "dangerous course." Shah Mohammed Riza Pahlevi and his palace circle are supporting this course of action against formation of the company, the Russian newspaper said.

Jones to Drill 100 Wells For Petroleos Mexicanos

Petroleos Mexicanos, oil production corporation owned by the Mexican Government, has contracted J. Edgar Jones to drill 100 wildcat oil tests in Mexico for approximately $20,000,000 it was reported recently by Roland C. Kizer, Baton Rouge, La., attorney for Jones.

Drilling will be on a cost-plus basis and will take about 3 years with tests ranging from 6,000 to 12,000 ft., the attorney said. Locations for the wildcat tests have been spotted from Reynosa, near the Texas border, to the Gulf of Mexico and down the east coast to a point north of Vera Cruz, according to Kizer.

The Jones contract constitutes about one-third of a 300-well wildcat exploratory program planned by the Mexican Government, he said.

Creole Sets 6-Month Crude Production Record

Creole Petroleum Corp. set a new 6-month crude-oil production record during the first half of 1947, with a net production, plus royalty oil, of 104,598,359 bbl., or 577,891 bbl. daily.

In a letter to stockholders, A. T. Proudfit, president, said this represents an increase of approximately 9.5 per cent over the corresponding period in 1946 and a slight increase over the last 6 months of 1946. Creole's Venezuelan production is currently running at about 600,000 bbl. daily.

The new record was set, Proudfit explained, despite the closing in of an estimated 25,000 bbl. daily of potential production during the first 4½ months of this year for lack of transportation facilities.

First Oil Imports Due in Germany

The first shipment of a scheduled 15,000 tons of Venezuelan crude oil monthly (about 105,000 bbl.), was to arrive in Hamburg last week, under a program adopted by the United States and British military governments.

Germany is to export 50 per cent of the finished product to pay for the crude oil and the remaining 50 per cent will go into the German economy of the combined Anglo-American occupation zones.

Turkey Buys Tankers

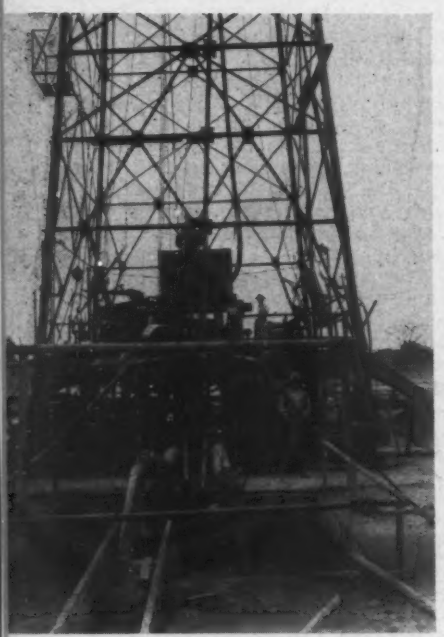
Two tankers are among the 10 ships sold recently for $7,400,000 by the U. S. Maritime Commission to the Republic of Turkey. The Turkish Government will spend approximately $6,000,000 for reconditioning and repair work, to be done in American shipyards.

THE author on his recent South American trip first visited Quito, the capital city of Ecuador (population 150,000, elevation 9,500 ft.) where details of the exploratory drilling of Shell Oil Co. of Ecuador, Ltd.'s 10,000,000-hectare concession east of the Andes were obtained. He proceeded to Guayaquil, the large port city (population 160,000) and supply center for the oil companies, then to the Santa Elena Peninsula, location of the oil fields and refineries.

by Kenneth B. Barnes

The author snapped this picture of the "Ferrocarril a la Costa" just before getting on to make the 152-kilometer, 5-hour trip from Guayaquil to Santa Elena

Ecuador Has Small But Lively Integrated Petroleum Industry



Above: When this picture was taken, the crew of Ecuadorian nationals on the A.E.O.I. rig had just made a new Atlanta-sand completion; it is ready for swabbing in

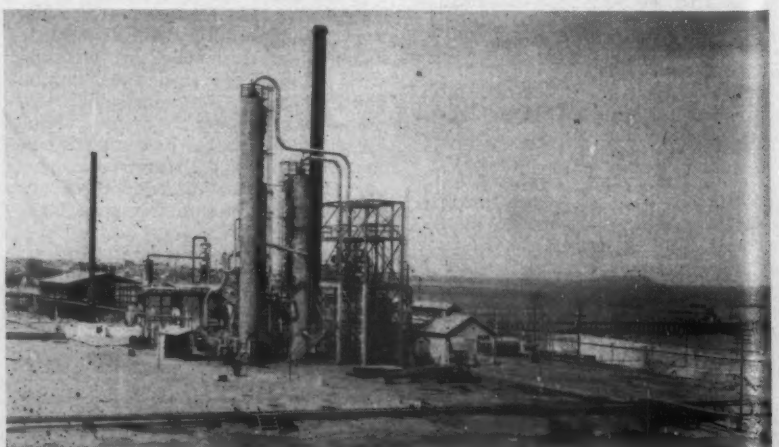
International

ECUADOR has an area of about 175,000 sq. miles—four times that of the State of Ohio. Its population of 3,100,000, however, is not quite half that of Ohio. Probably no other South American country presents a more diversified land surface. From north to south for 500 miles Ecuador is crossed by two parallel ranges of the Andes, the peaks towering 15,000 to 21,000 ft. Pacificward are the Guayas lowlands, and to the east lies the forested, wet "Oriente." The hot, rainy reason is from December to May. The language is Spanish; the unit of currency is the sucre ($0.0665 U. S.).

While the production and refining figures for Ecuador are small compared with many other South American oil-producing and consuming countries, nevertheless the oil business there is a busy, fully integrated activity. And, interestingly, all phases—drilling, production and refining—so far happen to be confined within one small area, the Santa Elena Peninsula.

The industry is important to Ecuador's economy and well being. Consumption of refined products, percentagewise, has risen phenomenally in Ecuador during the past year and new peak demands arise constantly. More drilling, production, and products are the keynote of the companies operating in the country.

Anglo - Ecuadorian Oilfields, Ltd., Ecuador's largest oil producer, found its first oil in 1920. By 1925, shallow drilling on the Santa Elena Peninsula had gradually increased production up to the 350-bbl.-per-day mark. By 1935, much more drilling to the shallow Socorro sand moved the company's output up to 2,000,000 bbl. per



Right: Refinery of Anglo-Ecuadorian Oilfields, Ltd. (capacity 2,700 bbl. per day) at La Libertad, on Santa Elena Peninsula, processes gasoline, naphthas, kerosine, diesel, and fuel oils

year. From 1935 to the present, further shallow drilling plus development of the important Atlanta sand, mostly about 4,200 ft. deep, has kept Anglo-Ecuadorian's yearly production at a constant figure of about 2,000,000 bbl. per year.

In 1937 a refinery was built, with a pier reaching out into the Pacific to load small tankers and freighters for taking refined products up the Guayas River to Guayaquil. The refinery on the north side of the peninsula is connected by the company's narrow-gage railroad to Ancon, the company's operating headquarters.

The Ancon headquarters of A.E.O.L. is a city in itself. Company personnel is about 1,400, and with the families and others the total population on the concession is perhaps 4,000. There are commissaries, telephone, and radio-communication systems, machine shops, schools, and many other facilities needed for such a remote spot.

Ecuador Oilfields, Ltd.

Ecuador Oilfields, Ltd., has established an unusual and interesting record in 9 years. In that time part of the 4,200-ft. Atlanta sand oil zone on its Tigre concession has been developed into production at the rate of 1,400 bbl. per day. The company has become established as a small but completely integrated oil organization.

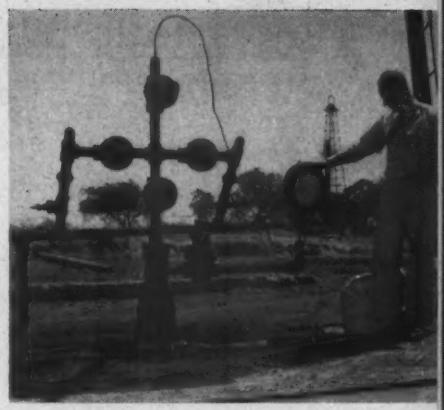
E.O.L. is adding more development wells, and an exploratory campaign is under way on nearby concessions. The company operates its own pipeline system, and some 40 per cent of its crude is charged through its topping plant to manufacture gasoline, naphtha, kerosine, diesel oil, and residual fuel.

Geological Divisions of Peninsula

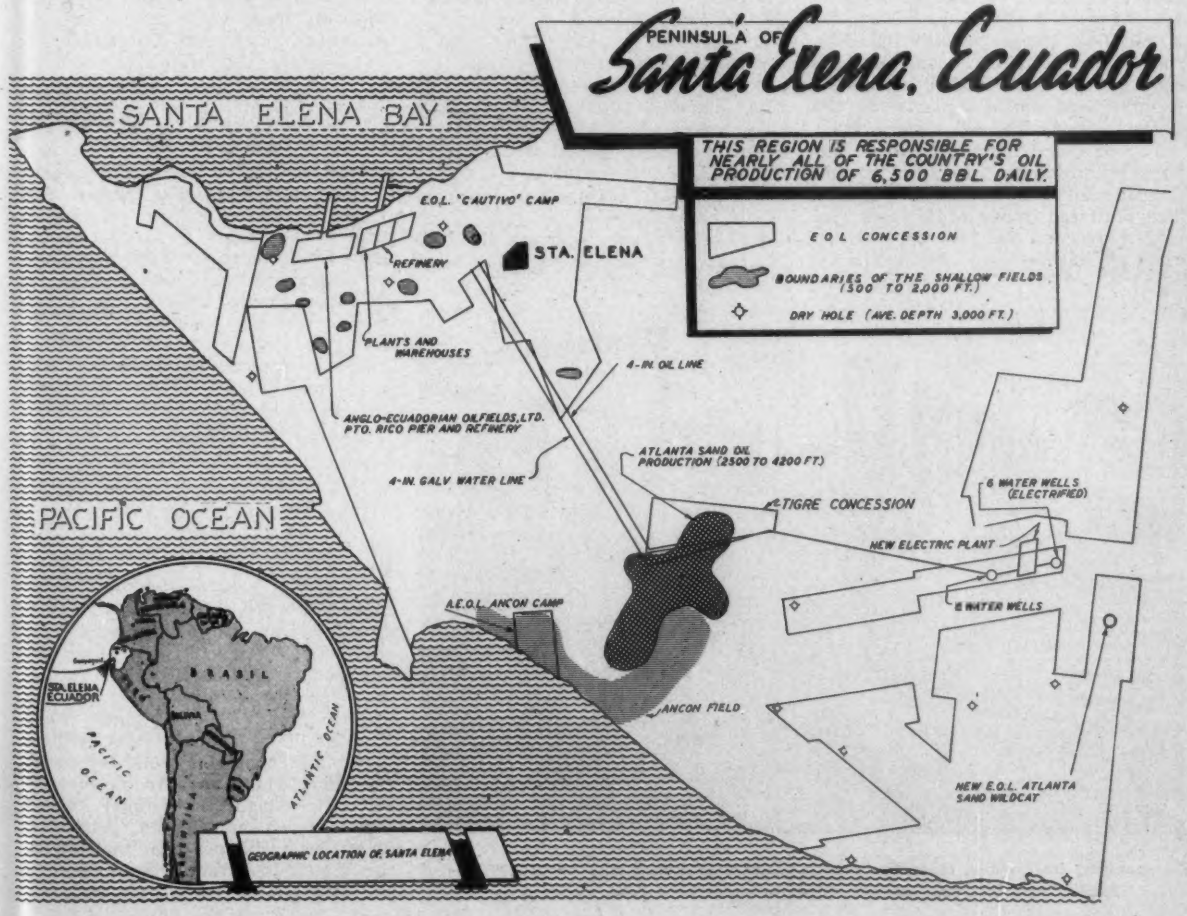
The Santa Elena Peninsula is a triangular strip of land, in the province of Guayas, that juts out into the Pacific Ocean for some 20 miles. Guayaquil lies due west 75 miles and the large majority of petroleum products from the peninsula move to there by tanker for distribution throughout the country. First oil production on the peninsula and its use, incidentally, really date back to the Spanish Conquistadores who obtained oil from seepages and boiled it down to pitch for caulking their boats.

The peninsula is divided into two geological areas. The north half has sporadic occurrences of dolerite and chert. The beds in many places dip very steeply from past tremendous disturbances and crushing forces. Shallow wells drilled into the buried cherty masses have found commercial oil accumulated in fissures.

To the south and southeast, there



Ecuador Oilfields keeps continuous records of tubing and casing-head pressures on its Atlanta-sand flowing wells, plus production and gas-oil-ratio tests. Here, John Martyn, geologist-engineer, is checking a new completion


PENINSULA OF
Santa Elena, Ecuador
SANTA ELENA BAY
THIS REGION IS RESPONSIBLE FOR NEARLY ALL OF THE COUNTRY'S OIL PRODUCTION OF 6,500 BBL. DAILY.
E.O.L. 'CAUTIVO' CAMP
STA. ELENA
REFINERY
PLANTS AND WAREHOUSES
4-IN. OIL LINE
ANGLO-ECUADORIAN OILFIELDS, LTD. PTO. RICO PIER AND REFINERY
4-IN. GALV. WATER LINE
ATLANTA SAND OIL PRODUCTION (2500 TO 4200 FT.)
TIGRE CONCESSION
6 WATER WELLS (ELECTRIFIED)
NEW ELECTRIC PLANT
6 WATER WELLS
A.E.O.L. ANCON CAMP
ANCON FIELD
NEW E.O.L. ATLANTA SAND WILDCAT
PACIFIC OCEAN
E O L CONCESSION
BOUNDARIES OF THE SHALLOW FIELDS (500 TO 2,000 FT.)
DRY HOLE (AVE. DEPTH 3,000 FT.)
BRASIL
STA. ELENA ECUADOR
PACIFIC OCEAN
ATLANTIC OCEAN
GEOGRAPHIC LOCATION OF SANTA ELENA

are the Seca and Socorro shales and sandstones (oil productive in local areas) of the upper Eocene, covered mainly by deposits of Oligocene sands. Below the Socorro lies the "clay pebble bed," and below that the Atlanta sandstone which is the deeper pay in the Tigre area.

Types of Production

Scattered in nearly a dozen places over the peninsula are small oil pools, producing from the Oligocene and the Seca and Socorro sands. The wells vary in depth from 500 to 2,000 ft. Altogether there are some 600 shallow wells, of which E.O.L. owns about 65 and A.E.O.L. 450 or more. These two concerns are of British origin. Caroline Oil Co., Petropolis Oil Co., and Concepcion-Ecuador Oil Co., all domestic companies, account for the remainder of the shallow wells. The wells are pumped from central powers.

The Atlanta oil area shows no significant structural feature. In general, the sand is hard, dense, impermeable, and of low porosity. However, scattered here and there over a vertical section of 1,500 ft. or more, are zones of fissures and cracks. Oil is found in these. All oil found in the Oligocene and Eocene beds is considered to have migrated into the fissured and faulted places of the present accumulations.

Top of the Atlanta production has been found as high as 2,100 ft. and the deepest penetration is 6,200 ft. The scattered zones of fissures and cracks over an interval of 1,500 ft. or more, in effect, for each well constitute a reservoir made up of a complex network or honeycomb of minute faults. Nearly every well has its own unique fault block and fissure system.

This long battery of tanks is in Ancon (Socorro sand) field of A.E.O.L.; it is completely manifolded for gaging individual wells

Development of Atlanta Sand

Anglo-Ecuadorian has two diesel rigs on the deep Atlanta sand development and also owns four steam-powered rotary rigs. Two spudders are used continuously in drilling the shallow Socorro sand wells, and a slim-hole rotary drills core tests, exploratory wells, and Socorro production. Ecuador Oilfields is operating two rotary rigs in developing its Tigre concession. Additional rigs are on order by both concerns.

Present static bottom-hole pressures of the Atlanta wells average about 1,000 psi., although from place to place are very erratic (original pressures about 1,600 psi.). The productive mechanism is definitely a combination of internal gas drive and gravity segregation down through the system of cracks and fissures. Ecuador Oilfields has 13 Atlanta wells flowing naturally, and 6 on individual pump units. Majority of the pumps are of the sectional liner type. A hydraulic pumping unit is being installed and equipment is on hand for experimental gas-lift work. Anglo-Ecuadorian has some 90 deep Atlanta sand wells, some flowing, others being pumped, and some being produced by gas lift via 3 multicylinder compressor units. At the lift plant, two more compressors are on gas-repressuring service; others may be added.

Anglo-Ecuadorian, as previously stated, has 450 or more of the shallow Socorro sand oil wells. One unusual central-power installation of the concern handles, from one spot, probably a larger number of pumping jacks than in any other field in the world. This one power has connected to it 87 producing wells and 6 counterbalances. The 66-hp. 2-cylinder gas engine is set in a concrete cellar alongside and underneath the power, so that the power pinion can be driven from eight V-belts from the engine below. This leaves almost no blocked-off or inaccessible space for rod lines through the full 360°.

For many years, on the peninsula, the only fresh-water supply in good quantities was that obtainable by evaporating sea water in batteries of Cornish (water drum) boilers. Hence, A.E.O.L. in the past has obtained its water from the sea—up to 180 to 200 tons per day. A new central installation for this processing is now complete, near Ancon. Salt water from the Pacific is pumped through desanders to a concrete sea water basin (capacity 2,000 tons.) After passing through heat exchangers to water drum boilers, the steam moves through condensers and exchangers via a hot well to another 2,000-ton concrete storage basin. The new installation has 12 large exchangers and boilers, plus condensers.

Ecuador Oilfields also has had distillation installations, plus a half dozen shallow water wells near Tigre. For more water, however, recently six new wells have been drilled and equipped with electrically driven, vertical-centrifugal pumps. A closed-in concrete water storage basin of 4,000-bbl. capacity and a new electric pump station is now complete. There are two 15-kw. 440-volt generators, direct driven by diesels, for furnishing power to the electric motors at the water wells. Each well has its own velocity flow meter and control system set up at the plant. There are two diesel-driven, five-stage centrifugal water pumps, each capable of delivering up to 5,000 bbl. per day, to transfer the water into the galvanized pipe line to Tigre, the camp, refinery, etc.

For supplying fresh water, these banks of 24 water-drum boilers take 180 to 200 tons of Pacific Ocean per day, and make distilled water for A.E.O.L.'s operations

WASHINGTON WATCHING

BY HENRY D. RALPH

Gas-Use Litigation

WASHINGTON.—The Federal Power Commission has gone to court to control industrial sales and end use of natural gas, but in a peculiar set of circumstances which has not, so far at least, aroused the natural-gas industry to fears that FPC is attempting to widen its jurisdiction.

The commission has filed a complaint in the federal District Court in Detroit to enjoin Panhandle Eastern Pipe Line Co. and Michigan Consolidated Gas Co. from delivering gas to five large industrial users in the Detroit area. *(See Natural Gas News, page 117).* The sales total some 27,000,000 cu. ft. per day, which FPC says should be delivered to Michigan Gas Storage Co. for underground storage this summer for use by Detroit area domestic consumers next winter.

The industrial sales are being made by Michigan Consolidated, a local distributor, but the gas is moved interstate by Panhandle. The basis of the suit is that the sales violate the terms of the contract between the two companies and particularly Panhandle's rate schedule which is within jurisdiction of FPC. Incidentally, Panhandle, for once, agrees with FPC, though it has fought with the commission probably more than any other company in the business.

Similar Contract Tried

A couple of years ago Panhandle attempted to make a similar contract with Ford but was stopped by FPC on the ground that while direct industrial sales were normally outside its jurisdiction it did have power to prevent such sales if they would impair the company's ability to serve customers distributing to householders. Panhandle threatened to take this case to the courts for a showdown on the commission's authority over direct industrial sales, but before the legal proceedings progressed very far Panhandle's other customers requested the gas intended for Ford and the contest was abandoned.

Now, it develops, Michigan Consolidated is buying Panhandle's gas ostensibly for domestic distribution in Detroit but actually is selling large quantities of it to Ford and other industrial users on terms which violate Panhandle's rate schedule. FPC argues that if it is wrong for an interstate pipe-line company to make industrial sales which jeopardize its ability to serve domestic consumers, it is equally wrong for a pipe line's distributor customers to make the same industrial sales.

The public interest is seriously and detrimentally affected, FPC told the court, because there will be a shortage of gas for Detroit householders this winter and Panhandle will be unable to deliver enough gas into the area to meet all demands.

A peculiar feature of the Detroit situation, which makes this case unique, is the presence of a natural-storage field where this 27,000,000 cu. ft. per day could be held until winter. Michigan Gas Storage Co. says that if it does not get enough gas to keep reservoir pressure up to 350 psi. there will be water encroachment which will permanently injure the field.

Big Inch Operation

AN early decision by the Federal Power Commission on the application of Texas Eastern Transmission Co. for a certificate to acquire and operate the Big Inch pipe-line system is indicated by the commission's action in setting final argument for September 22 although hearings are not yet completed.

Texas Eastern is now operating the lines in natural-gas service under a temporary certificate from FPC and a lease from War Assets Administration. Its offer to purchase the government-owned lines will not become effective unless FPC grants a permanent certificate and authorizes installation of compressor stations and other facilities.

Hearings for taking testimony have been going on in Washington since July 7, and have included data on the physical properties involved, engineering aspects of the proposed gas service, financing plans, and contracts for gas supplies and for distribution. The chief witness this week was R. H. Hargrove, new president of Texas Eastern, who told the commission that the company has gas supplies, customers, facilities, and everything needed to conduct a permanent and successful operation except the FPC authorization required before financing can be completed.

Politics and the Co-ops

A CONGRESSIONAL investigation of cooperative associations opened in Washington this week on a sour note amid charges of politics, prejudice, and persecution.

These hearings are being held by the House small-business committee, and are not primarily concerned with tax treatment of coops, a study which will be opened by the ways and means committee in November as part of its over-all revenue revision.

The small-business committe plans to hold hearings in various cities to determine whether or not coops are competing unfairly with small private enterprises, in the course of which it probably will hear many complaints about cooperatives in the oil business. But to start off it picked a little consumer coop running retail stores in the Government-owned suburban housing project of Greenbelt —famous as "Tugwelltown" during the early social-reform days of the New Deal. The charge is that the coop is a monopoly, since it leases the only business property in the shopping center.

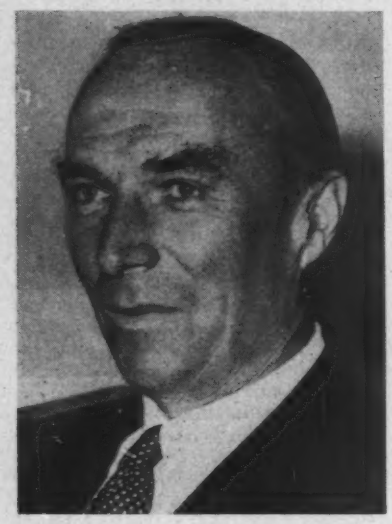
Critics say this investigation is political because Greenbelt is a government housing project, because the first victim is a consumer coop which does not have tax exemptions of any sort, and because last year when the Democrats had a majority this same committee gave coops a clean bill of health.

Military-Supply Problems

FOLLOWING the request of Army and Navy officials, the National Petroleum Council will keep active its committee on military and government petroleum requirements, but Chairman Walter S. Hallanan has declined to accept the resignation of J. F. Drake as committee chairman. Drake, president of Gulf Oil Corp., asked to be relieved of this duty since he expects to be out of the country during the next few months. Hallanan has appointed Howard Page, executive assistant to the president of Standard Oil Co. (N. J.) as acting chairman in the absence of Drake.

This committee completed its original assignment when it presented to the last council meeting a report on government requirements for various petroleum products and suggestions for improving government procurement methods, but apparently it will have considerable more work to do this fall and winter since military orders are not yet being filled in full. Although leading oil refiners have given oral promises that they will meet their fair shares of government requirements, Army and Navy officials are not satisfied that this will provide sufficient supplies when and where needed and they are still advocating an allocation system under which each refinery would be obligated to supply definite volumes of products to the Government.

PERSONALS



Industry Veteran Back As Head of Ethyl Corp.

EDWARD L. SHEA, president since 1939 of North American Co., has returned to the oil industry as president of Ethyl Corp., succeeding Earle W. Webb, who has been named chairman of the board.

A graduate of Princeton University, Shea entered the oil business in 1916 in the Bayonne, N. J., refinery of Tide Water Oil Co. During the first war he served as a naval aviator, returning to the company later as a salesman. In 1920 he was sent to Mexico, returning after a 2-year assignment there to the Bayonne refinery as manager of industrial relations.

After 6 months in this capacity, Shea was transferred to the company's New York office as assistant to the vice president in charge of manufacturing. In 1924 he was appointed assistant to the president and elected a director of the company.

In 1925 he was elected vice president and for the next 6 years was in charge, first of manufacturing and later of sales. In 1931 he was appointed executive vice president and 2 years later was elected president of Tide Water.

With the merger of Tide Water Oil Co. and Associated Oil Co., Shea was named executive vice president of the new company, under President William F. Humphrey, previously president of Associated. Three years later, in 1939, he resigned to become president of North American, a position he held until acceptance of his present position.

Charles Keller has joined Derby Oil Co., Wichita, Kans., as assistant to **I. L. Turner**, head of the land department.

W. R. Shirk, formerly with Cities Service Oil Co. at Wichita Falls, Tex., and later consultant geologist at Abilene, Tex., has joined the staff of Bay Petroleum Co. at Wichita Falls.

J. K. Petty, formerly with the bureau of economic geology at Austin, has joined the firm of Schweer & Hardison at Wichita Falls.

Robert Bartlett, assistant resident accountant for Kuwait Oil Co., Ltd., for the past 2½ years, has returned to the U. S. and resumed his duties with Gulf Oil Corp. in New York.

T. E. Patrick, general superintendent of Kuwait Oil Co., Ltd., will return to Kuwait September 11, going by way of England.

Russell I. Alberts, Carl R. Bitting, Otto V. Ruble, and **Philip H. Slater**, all drillers with Shell Oil Co., Inc., have been transferred from Ventura to Oilfields, Calif.

John E. Owens, head of Shell Oil Co., Inc.'s North Texas geological department at Wichita Falls, Tex., has been transferred to Oklahoma City in a similar capacity. **James Wilson**, Houston, will assume Owens' duties at Wichita Falls. **James A. Rehler**, geologist at Centralia, Ill., has been transferred to the North Texas district.

John W. Emison, vice president and treasurer of Texas Pipe Line Co., has been elected a vice president of the Houston unit of Controllers Institute of America. New directors of the Houston group are **Harry B. Drennan**, Superior Oil Co., **S. G. Loy**, Humble Pipe Line Co., and **Weldon M. Padgett**, Pan American Pipe Line Co. In other recent elections **Roger W. Leason**, vice president and treasurer of Emsco Derrick & Equipment Co., was chosen vice president of the Los Angeles unit; **Gordon B. Schaefer**, Southeastern Pipe Line Co., vice president of the Atlantic Group; and **Sumner E. Hippensteele**, Allied Oil Co., director of the Cleveland, Ohio, group. New directors of other local groups include **Ralph W. Rager**, Oil Well Supply Co., Dallas; **William A. Jackson**, Standard Oil Co. (N.Y.), New York; **Wilson K. Minor**, Standard Oil Co. of California, San Francisco; and **F. S. Slick**, Ohio Oil Co., Toledo.

Gene Walker, chief clerk for United Gas Corp. in the purchasing department at Houston, has been promoted to purchasing agent in the general offices.

Caldwell Starkey, member of the geological department of Stanolind Oil & Gas Co. for the past 6 years, has resigned to open offices as a consulting geologist in Wichita.

Harry Boyd - Snee has joined the crude - oil purchasing department of Standard Oil Co. of Indiana. He formerly was oil editor of the Wichita Beacon.

F. G. Cance, head of the technical department of Societe Nationale de Material pour la Recherche et l'Ex-

F. G. CANCE

M. BINET

ploitation du Petrole (S. N. Marep), will take over the New York management of S. N. Marep October 1, and will be assisted by **M. Binet**. Cance will succeed **Marcel Schwob**, who may return to Paris. Cance has been in the oil business since 1929 when he started work for Steava Romana as chief engineer. After the collapse of France he joined the First Free French Forces in Cairo and when honorably discharged held the rank of colonel. Binet joined S. N. Marep in 1946 and has been handling United States oil equipment purchases. Schwob succeeded **E. L. Lassauze** in May 1946 and was assisted by **R. Butin** and **J. Bertaux** in New York and **P. E. Abadie** in Washington.

James Hill, Jr., has been sent to Venezuela as an exploratory drilling foreman in the overseas section of Carter Oil Co. Hill previously had spent some time in Venezuela with Seismograph Service Corp.

Henry Baskerville, president of Western Oil & Fuel Co., has been named president of the new Waterway Terminals, Inc. **Dayle G. Malone**, vice president of Petroleum Heat & Power Co. of Illinois, has been named vice president, and **Edward L. Stauffacher**, superintendent of operations for Cities Service Oil Co., secretary.

Irwin W. Alcorn, Pure Oil Co., Houston, has been elected chairman of the Petroleum Division, American

I. W. ALCORN

P. E. FITZGERALD

C. BEAL

J. H. MURRELL

Institute of Mining & Metallurgical Engineers. He will be installed during the institute's annual meeting in New York next February. Other new officers: Vice chairmen, **Paul E. Fitzgerald,** Dowell Incorporated, Tulsa, and **Carlton Beal,** consulting petroleum engineer, Los Angeles, and 1943-44 chairman, Pacific Coast district, Division of Production, American Petroleum Institute. **John H. Murrell,** partner in DeGolyer & MacNaughton, Dallas, was elected to a 3-year term on the division's 10-man executive committee as was **Benjamin C. Craft,** head of the department of petroleum engineering at Louisiana State University.

Lionel W. Wiedey, manager of Tropical Oil Co., recently acted as representative of all oil companies operating in Colombia in presenting a Ps 4,200 ($2,394) gift for the purchase of geological and geophysical books and literature to the Institute Geofisico de los Andes Colombianos. The **Rev. J. E. Ramirez,** S. J., director of the Instituto and an internationally recognized authority, received the gift.

Blake M. Caldwell, former general manager of Emsco Derrick & Equipment Co.'s plant at Dallas, has joined the mechanical-equipment division of the chemical engineering department of Phillips Petroleum Co., Bartlesville, Okla. He is a member of the American Chemical Society and American Petroleum Institute. Also joining the same department as chemical engineer is **Dr. Robert G. Atkinson,** formerly with Hydrocarbon Research, Inc., and associated with Shamrock Oil & Gas Corp. at Amarillo, Tex. **Dr. Lyle D. Goodhue,** former director of research for Aerosol, Inc., has joined Phillips' research department as senior chemist.

Robert Siegel, president of Socony-Vacuum Oil Co. of Venezuela, will be in the United States until October 15 on a business-vacation trip. While in the United States, he will interview prospective employes for work with the company in Venezuela.

Louis B. Bos and **Thomas R. Gibbons,** chemical engineer and chemist, have joined the staff of the Beacon Laboratories of The Texas Co., at Beacon, N. Y.

Louis Franklin, independent geologist and drilling contractor of Houston, has just returned from 14 months work in Palestine, where he has been directing exploration work for Jordan Exploration Co. in the Dead Sea region.

W. H. Ryer and **H. M. Hanbury,** both in the foreign sales division of The Texas Co.'s New York office, have just returned from a business trip to Central and South America.

W. J. Connelly, refinery manager for Creole Petroleum Corp., and **George Johnston,** Creole's marine manager, are both in the United States on business.

Gay Dorrough, scout for Gulf Oil Corp., is being transferred to the Rocky Mountain region from Oklahoma.

W. C. Bednar, petroleum engineer with Amerada Petroleum Corp., has joined the staff of Meyer & Achtschin, consulting geologists at Dallas, Tex. Bednar was a former associate professor of petroleum engineering at the University of Oklahoma and had previously been in charge of drilling and production for Northern Ordnance, Inc. He was also an independent consultant.

F. E. Meleen, assistant superintendent of the Avoca, Tex., district, for Humble Oil & Refining Co., has been promoted to district superintendent. Transfers in the company's production department supervisory forces were: **J. D. Ball,** Kelsey district superintendent, Encino, Tex., to Corpus Christi as Flour Bluff district superintendent; **Frank Bass,** Flour Bluff district superintendent, Corpus Christi, to Encino as Kelsey district superintendent; **F. A. Jewell,** farm boss in the Vernon district, to the Avoca district and promoted to assistant district superintendent.

Harry L. Crawford has been appointed district manager for Sun Oil Co. at Cincinnati, Ohio, succeeding **W. P. Foster.** Crawford was succeeded by **Elmer H. Moss** at Grand Rapids, Mich.

Charles L. Harding, wartime director of the Petroleum Administration of District 1, and former senior attorney with Socony-Vacuum Oil Co., Inc., has been placed in charge of supervising and coordinating activities of the company in the Middle East.

John Poje has been named to a new fellowship in chemistry established at the University of Kansas by Stanolind Oil & Gas Co. of Tulsa. The fellowship pays $1,000.

E. M. Ikard, Haskell sub-district manager for Lone Star Gas Co., has resigned.

Everett L. Welch left the United States recently for Colombia to join Tropical Oil Co. as a drilling foreman.

Robert W. McDowell has been elected executive vice president of Mid-Continent Petroleum Corp., a position recently created by the board of directors. McDowell has headed the company's marketing division since 1928. He joined Producers & Refiners Corp., Tulsa, shortly after World War 1 as a sales department stenographer, later advancing to assistant sales manager. He subsequently joined Hawkeye Oil Co., becoming president of the company's successor after its merger with Black Hawk Oil Co. He was appointed manager of the northern division after the company was purchased by Mid-Continent.

Marcel R. Thomas, director of Groupement D'Achat des Carburants (G.A.C.), the French Petroleum Purchasing Agency in New York, recently acquired additional duties as chief of the Service de Material de Raffinage and as such will supervise the purchase of certain refinery equipment in the United States for private French refiners.

Dr. E. R. Gilliland, Massachusetts Institute of Technology faculty member, has opened the second annual series of lectures in science conducted by Humble Oil & Refining Co. at its Baytown, Tex., refinery, speaking on "Transference of Proc-

PERSONALS

esses from Small to Large Scale." He will be followed by **Prof. H. A. Laitinen,** University of Illinois; **Prof. A. P. Colburn,** assistant to the president and advisor on research at the University of Delaware; and **Prof. Richard T. Arnold,** of the chemistry department of the University of Minnesota.

Antonio Monino, formerly with Cia. de Petroleo Shell de Colombia, is now working for Colombia's Ministry of Petroleum in the technical statistical section.

R. E. King, former geologist for The Texas Co. at Jackson, Miss., has been transferred to New York as a coordinator in the foreign oil department.

Sol M. Bunnell, geologist for Humble Oil & Refining Co. at Roswell, N. M., has been transferred to the Midland division headquarters.

Raymond Doty, geologist for Pure Oil Co., has been transferred to the Midland, Tex., district office from the Shreveport, La., district office.

Russell Cotton, geologist at Midland, Tex., has joined the Permian Basin staff of Pure Oil Co. at Midland.

Bernard M. Bench, former geologist with Geophoto Services of Denver, has established an office there as a consultant.

Shifts

Paul H. Farmer, geologist, Brinkerhoff Drilling Co., from Evansville, Ind., to Casper, Wyo.; **Harry J. Russell, Jr.,** geologist, American Trading & Producing Corp., from Middlesborough, Ky., to Midland, Tex.; **Jesse J. Smith,** foreman, Sinclair Refining Co., from Westminster, Md., to Mechanicsburg, Pa.; **W. B. Phillips,** engineer, Union Producing Co., from Tinsley, Miss., to Refugio, Tex.; **R. H. Alagood,** geologist, Sunray Oil Corp., from Jackson, Miss., to Shreveport, La.

Carl A. Mitchell, engineer, California Co., from Natchez, Miss., to New Orleans, La.; **Earl E. Taylor,** engineer, Southern California Gas Co., from Manhattan Beach, to Alhambra, Calif.; **Eric H. Reichl,** engineer, California Research Co., from Orinda to Berkeley, Calif.; **C. E. Leach,** geologist, Tide Water Associated Oil Co., from Ventura to Los Angeles; **Robert H. Barnes,** foreman, General Geophysical Co., from Cotulla to Crockett, Tex.

E. H. Shannon, foreman, The Texas Co., from Palacios to Brenham, Tex.; **Paul M. Rice,** engineer, The Texas Co., from Teague to El Campo, Tex.; **J. T. Crawford,** superintendent, Skelly Oil Co., White Deer to Skellytown, Tex.; **Victor Bychok,** foreman, Atlantic Refining Co., Andrews to Big Lake, Tex.; **Bruce S. Weaver,** engineer, Phillips Petroleum Co., Andrews to Odessa, Tex.

J. F. Crews, foreman, Atlantic Refining Co., Corpus Christi to Houston; **J. D. Williams,** engineer, Wm. Cameron & Co., Inc., Gladewater to Tyler, Tex.; **Charles F. Van Berg,** engineer, Humble Oil & Refining Co., Goose Creek to Baytown, Tex.; **A. J. Carroll,** engineer, Stanolind Oil & Gas Co., Greggton to Pampa, Tex.; **A. C. Elliott,** geologist, Shell Oil Co., Inc., Houston, Tex., to Lake Charles, La.

A. M. McLachlin, engineer, Shell Oil Co., Inc., Houston to New Braunfels, Tex.; **James E. Wilson,** geologist, Shell Oil Co., Inc., Houston to Wichita Falls, Tex.; **C. K. Taylor,** superintendent, New Mexico Asphalt & Refining Co., Odessa Tex., to Craig, Colo.; **L. H. Vautrain,** foreman, Phillips Petroleum Co., Phillips to Old Ocean, Tex.; **John J. Gibbons,** engineer, Shell Oil Co., Inc., Wichita Falls, Tex., to Wichita, Kans.

D. W. Rogers, superintendent, Delta Drilling Co., Pineville to Bunkie, La.; **A. G. Petkus,** engineer, Universal Oil Products Co., Shreveport, La., to Chicago; **L. J. Wickenhauser,** engineer, Gulf Oil Corp., Centralia, Ill., to Denver; **C. H. Mendenhall,** engineer, Stanolind Pipe Line Co., Craig, Colo., to Mitchell, Neb.; **W. A. Petersen,** foreman, Continental Oil Co., Greensburg, Kans., to Waurika, Okla.

George F. Brigance, superintendent, Socony-Vacuum Oil Co., Inc., Harrisburg, Pa., to Plainfield, N. J.; **Don W. Biddle,** superintendent, Denver Producing & Refining Co., Edmond to Perry, Okla.; **Milton E. Fox,** engineer, Carter Oil Co., Seminole to Tulsa, Okla.; **R. A. Hockenson,** engineer, Ohio Oil Co., Tulsa to Chickasha, Okla.; **W. E. Morrison,** superintendent, Sinclair Refining Co., Tulsa to Independence, Kans.; **C. E. Earle,** superintendent, Sinclair Refining Co., Tulsa to Independence, Kans.; **Laurent B. Smith,** foreman, Sinclair Refining Co., Tulsa to Bristow, Okla.

Harold B. Ward, assistant to the president and manager of the land department of Wilcox Oil Co., Tulsa, resigned effective September 15. He has been in the service of Wilcox Oil Co. for the past 25 years. Ward plans to continue actively in the oil business as an independent lease broker.

DEATHS

William V. Hartmann, 75, former vice president in charge of marketing for Gulf Oil Co., died August 24 in Pittsburgh, Pa., ending a 43-year career with Gulf.

William Lewis Dunning, 75, retired oil producer, died August 19 in Bolivar, N. Y.

Arthur F. Aylsworth, 61, vice president of Tuscarora Oil Co., Ltd., died recently in Harrisburg, Pa.

Edward R. Gnade, former oil operator and brother-in-law of former Gov. Alfred M. Landon of Kansas, died August 12 in Jamestown, N. Y.

Frank Webber, oil operator in the San Juan basin and a former production superintendent of Midwest Refining Co., died recently in Durango, Colo.

Edwin W. Pipkin, 52, district supervisor for Looboyle Refining Co., died August 22 in Tulsa.

Arthur N. Hendricksen, owner of Russian Oil Co. and affiliated firm, Penguin Oil Co., died August 16 in Chicago. He had been active in the oil business since 1915 and had headed his own company since 1928.

James A. Richie, 69, vice president and secretary-treasurer of Republic Light, Heat & Power Co., Inc., died August 19 in Buffalo, N. Y. He also was secretary-treasurer of Dominion Natural Gas Co., Ltd.

John H. Davidson, 60, oil producer, died August 19 in Rochester, N. Y. He was secretary-treasurer of Olean Petroleum Co. and at one time was associated with the late Wilson K. Page in the oil business.

William M. Stephenson, 82, credited with opening the gas field which gave San Antonio its first natural gas, died August 22 in San Antonio.

Otis Phillips, Sr., 60, well-known Texas oil operator, died August 14 in San Antonio.

Basil Hudson, 43, oil scout from Midland, Tex., was killed August 18 in an automobile accident.

W. D. Beaty, 54, engineer in pipeline department of Sinclair Prairie Oil Co., died August 24 in Tulsa.

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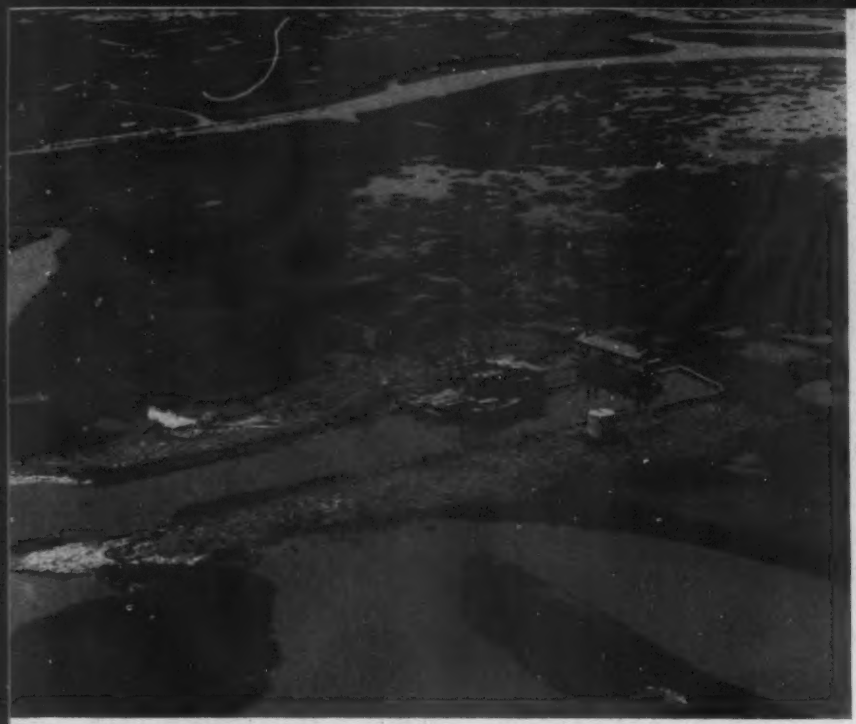


Left: Drilling barge "Trotter" and boiler barge "Cameron" on 1 Lafourche Basin Levee District, Queen Bess Island, Jefferson Parish, Louisiana

OPPOSITE PAGE

Left: Employes who assisted in drilling the 1 Lafourche Basin Levee District. Derrick floor: C. F. LeBouef; R. E. Posey, Jr., derrick man; S. J. Landry, fireman; R. A. Hornsby; N. A. Sellers; J. H. Anderson, driller, and in white shirt, Sam Hattaway, foreman. Pipe rack: Standing, M. L. Latta, relief foreman; L. P. Knight; E. Daigle; J. N. Daigle; J. N. DeSoto; R. H. Fournier; A. J. Henry; and Dave Bear, driller

Right: Cameron christmas tree installed on 1 Lafourche Basin Levee District, the well which now holds the record of being the deepest producer in the world

Texas Co. Sets New World Depth Record For Producing Well—13,904 Ft.

A NEW well has emerged to hold the record of being the deepest producer in the world. It is the 1 Lafourche Basin Levee District, in the Queen Bess Island area, near Grand Island, Jefferson Parish, Louisiana. The new record breaker, drilled to a total depth of 15,523 ft., was completed last month flowing through 5½-in. casing perforated at 13,879-13,904 ft., on ¼-in. choke, at the rate of 48 bbl. of fluid per 24 hours. There was 4,200 psi. flowing tubing pressure, 200 psi. separator pressure, 6,188,296 cu. ft. of gas per 24 hours. Gravity is 40.8°, corrected, no b.s.&w.

This is also the deepest well ever drilled in Louisiana. Previously, Shell Oil Co., Inc., held the record for the deepest producer with its 3 Smith State Unit 1, in Weeks Island field, Iberia Parish, Louisiana, which is producing from a perforated interval at 13,867-73 ft. and 13,878-88 ft.

The 1 Lafourche Basin Levee District was commenced November 17, 1946, and required a total of 219 days to drill. A 17½-in. hole was drilled from surface to 2,980 ft. where 13⅜-in. o.d. 68-lb. casing was set and cemented with 500 sacks. Then 11¾-in. hole was drilled below the 13⅜-in. to 12,004 ft., and 8⅝-in. casing set at 12,004 ft. Then 4½-in. o.d. 16.60-lb. Grade E drill pipe and four 7¾-in. o.d. drill collars (15,600 lb.) were used in drilling to the depth of 12,004 ft.

The 8⅝-in. casing, was floated in from 7,642 ft. to total depth of 12,004 ft. Maximum weight recorded during the setting of this string of 8⅝-in. was 346,000 lb. Calculated weight of the string of 8⅝-in. in air is approximately 525,000 lb.

Below the 8⅝-in. casing, a 7⅞-in. hole was drilled to a total depth of 15,523 ft., using 3½-in. o.d. 13.60-lb. Grade E drill pipe and twelve 5½-in. o.d. by 30-in. drill collars. Drilling was discontinued at this depth and a full string of 5½-in. o.d. casing was set at 13,998 ft., using 500 sacks of slow-set cement. One whirler washdown shoe and two float collars were employed.

Mud Program

Mud program used consisted of normal weight of 9.8 to 10.4 lb. per gallon to a depth of 12,004 ft. After setting 8⅝-in. casing, the mud was converted to a high pH starch mud by addition of caustic and quebracho. At 14,500 ft. the viscosity was difficult to control and barium carbonate was used to reduce the viscosity. From 15,000 ft. to total depth, viscosity was controlled by the use of caustic, quebracho, and water.

No difficult fishing jobs were experienced. A twistoff in bottom drill collar occurred at 6,755 ft. and was fished out with little difficulty. At 10,507 ft., bottom drill collar was twisted off and again was fished out easily. At 12,656 ft., one rock-bit cone was lost and recovered with side-door basket. At 13,611 ft., a part of a rock-bit cone was lost, but no attempt was made to recover.

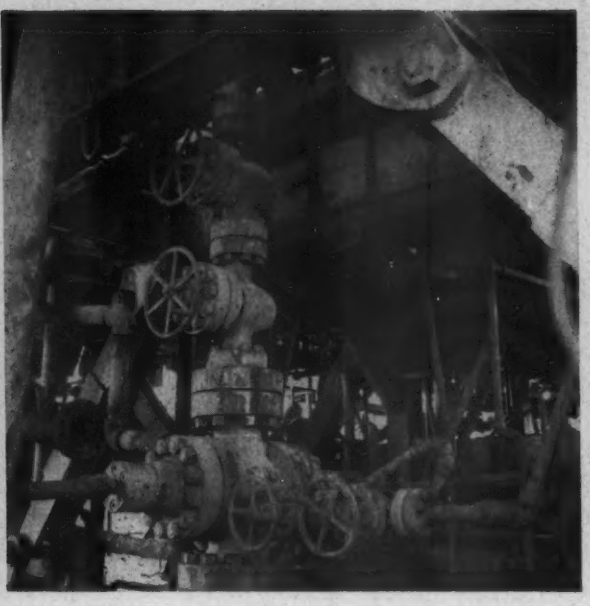
A number of Schlumberger side-wall cores and Homco side-wall cores were taken throughout the hole, and two conventional cores were cut, one from 15,056-64 ft. and one from 15,489-93 ft.

A total of 137 bits was used to drill to total depth of 15,523 ft., 36 being fishtail bits and 101 rock bits.

Subsurface-pressure survey indicated the pressure at the top of the producing perforations (13,887 ft.) to be 6,234 psi. under static conditions, with closed-in tubing pressure of 4,830 psi. While flowing on ¼-in. choke at the rate of 6,240,000 cu. ft. of gas per 24 hours, the bottom-hole pressure at 13,887 ft. was 5,685 psi., with surface tubing pressure of 4,220 psi. Bottom-hole temperature at 13,887 ft. is 242° F.

The well was drilled with the drilling barge Trotter, which is 114 by 56 by 10 ft. The derrick was 136 by 26 ft. size, capacity 800,000 lb. The drilling engine was 14 by 14 in., the standby engine 12 by 12 in. Pumps included one triplex and one 20-in. and one 18-in. unit. There were four 150-hp. boilers used, operating at pressure of 350 psi., saturated.

In the completion, the well was drill-stem tested in the zone from



13,879-13,904 ft. After testing, a hook wall packer was set above the perforations. A mixed string of 2 and 2½-in. tubing was used, about 7,000 ft. of 2½-in. on top and 7,000 ft. of 2-in. on bottom. The packer was set with 29,276 lb. A 15,000-lb. test christmas tree was used and the packer was set with a back pressure of 1,000 lb. on tubing. In the testing, the well was flowed into a high-pressure separator with varying amount of back pressure from 600 to 200 lb.

Testing Before Gun Perforating

Due to the anticipated high temperatures at the depth the well was to be completed, The Texas Co. engineers felt there was a possibility of the subsurface temperature igniting the powder charge of the shooting gun. To be on the safe side they had a dummy gun run in the hole, with four chambers loaded. Two of these chambers were loaded with regular powder and two were loaded with high-temperature powder and no bullets. The dummy gun was run in the hole and up and down between the depths of 10,000 ft. and bottom for a period of 1 hour and 15 minutes. This prolonged period in the hole was to give the powder a good opportunity to come up to subsurface heat. The gun was then pulled and it was found that the temperature had had no effect on either type powder. According to reference information if the temperature had reached 300° or better, the regular powder would have ignited. When the well was actually perforated, however, the high-temperature powder was used, to be on the safe side.

Comparisons With Previous Wells

This is the third well drilled on the Queen Bess Island prospect and in comparing 1 Lafourche Basin Levee District to the other two wells drilled, a very noticeable decrease in drilling time was obtained. The 1 Barataria Bay required 216 calendar days to drill to 14,490 ft. total depth. The 2 Barataria Bay required 193 calendar days to drill to 14,490 ft. The 1 Lafourche Basin Levee District required 165½ calendar days to drill to 14,490 ft.

It will be noted that 1 Lafourche Basin Levee District was drilled 50½ days faster than 1 Barataria Bay and 27½ days faster than 2 Barataria Bay to the depth of 14,490 ft. Further comparison with 2 Barataria Bay shows the following: 2 Barataria Bay required 198 days to drill to 14,577 ft. The 1 Lafourche Basin Levee District required 169 days to drill to 14,577 ft. This is a decrease of 29 days to this depth. Total calendar days for entire drilling of 1 Lafourche Basin Levee District was 219 calendar days.

It is believed that the increase for rate of drilling was primarily due to the addition of drill collars over and above the amount used on the other two wells, the rate of rotation which varied from approximately 45 to 60 r.p.m., plus the fact that the hole was larger below the protection string. The 1 Barataria Bay used 7-in. casing, 2 Barataria Bay used 7⅝-in., and 1 Lafourche Basin Levee District used 8⅝-in.

At the time drilling ceased the hole was in excellent mechanical condition, and it was not necessary to stop drilling due to condition of hole. At the total depth there was 3,519 ft. of open hole below the protection string. The amount of open hole is the greatest drilled, as of this date, in the Houma district, below a protection string. In addition, from time of drilling out below the 8⅝-in. o.d. casing to the total depth, no mechanical difficulties or fishing jobs other than loss of rock-bit cone were encountered.

New Mexico Royalty Oil To Be Sold to Bidders

Government royalty oil in New Mexico is being offered for sale to competitive bidders in accordance with the act of July 13, 1946, which gives the owners of small refineries a preference to buy such oil.

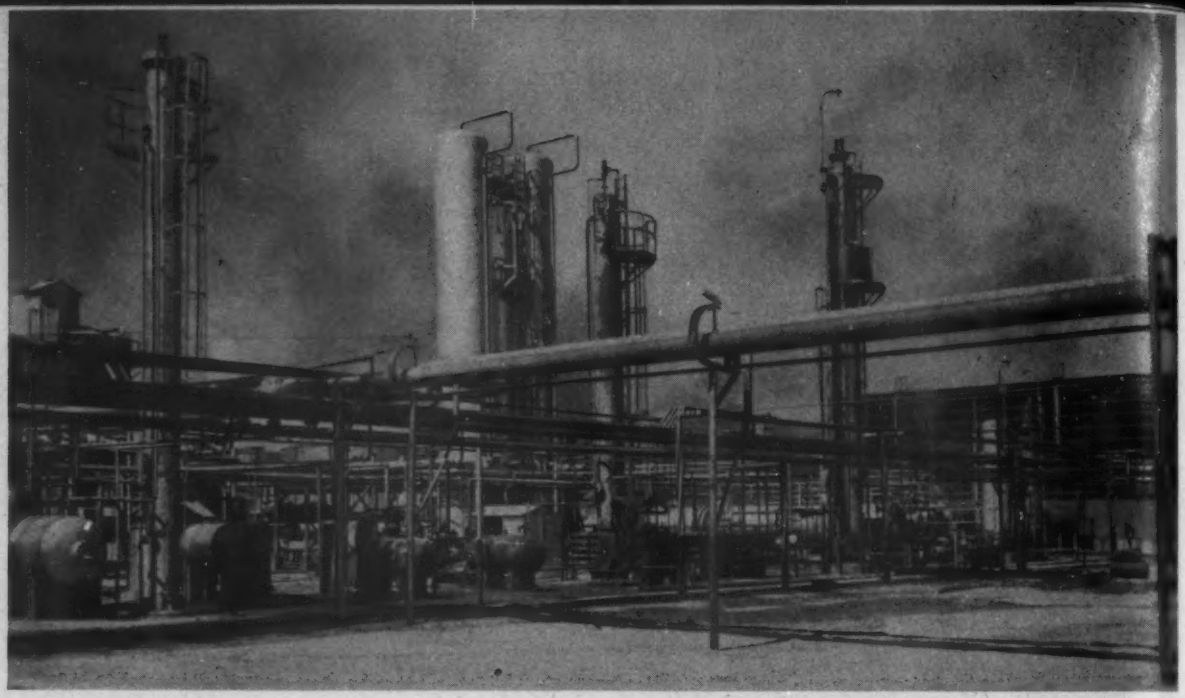
The monthly royalty oil will include 1,400 bbl. from Brunson pool; 2,160 bbl. from Eaves pool; 14,900 bbl. from Eunice-Monument pool; 970 bbl. of unitized and 9,100 bbl. of non-unitized oil from Grayburg-Jackson pool; 14,600 bbl. from Maljamar pool; and 3,000 bbl. from Rhodes pool.

Bids will be opened September 16.

N.P.A. Announces Plans For Annual Meeting

The National Petroleum Association holding its forty-fifth annual meeting September 17-19 in Atlantic City will feature discussions on opportunities of small operators and the importance of freedom of action to the oil industry. Panel discussions will be held covering problems of supply and demand and labor relations.

Speakers will include: J. B. Fisher, president, National Petroleum Association; Robert T. Haslam, Standard Oil Co. of New Jersey; James A. Perkins, vice president, Swarthmore College and assistant to the foreign economic administrator in World War II; Gerald D. Reilly, former member of the National Labor Relations Board; and D. P. Clark, Gulf Oil Corp.

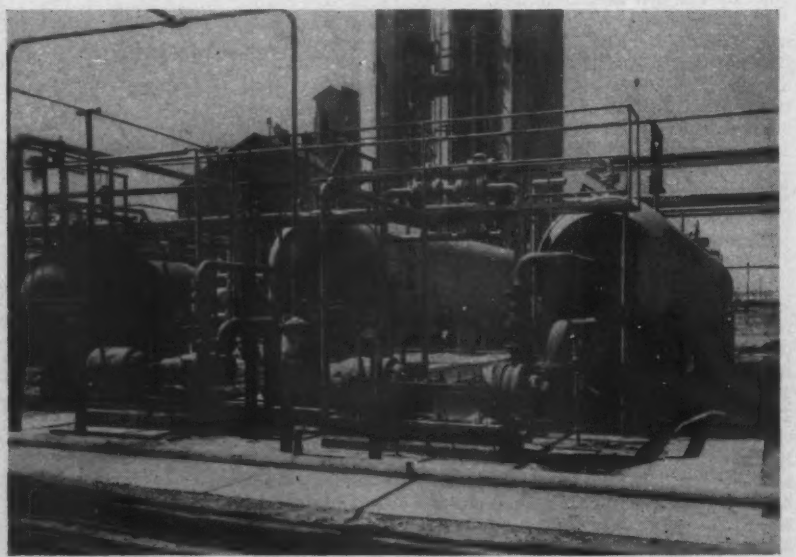


Portion of purification-plant facilities. The small columns are phosphate absorbers for scrubbing propane and isobutane and the phosphate-plant still. The two large columns are the amine plant stills

SHAMROCK COMPLETES Reconversion Program

by B. R. Carney

Closeup of final-stage caustic scrubbers for propane, showing centrifugal pumps used as contactors



WITH the end of hostilities in August 1945, Shamrock Oil & Gas Corp. was confronted with the same general problems of reconversion to supply peacetime markets, as for other oil operators. Because Shamrock is predominately a gas operator, these problems presented to it a different aspect, and the methods which it has applied have necessarily differed from those used by other oil companies. With over 130,000 acres of proven gas reserves, keynote of the company's reconversion program has been to develop improved outlets for products of its gas wells, namely, residue gas, natural gasoline, and liquefied petroleum gas products.

Much of Shamrock's residue gas has been and is now sold to carbon-black manufacturers. Throughout the early war years, conditions in the carbon-black industry did not encourage the purchase of gas on a quality basis. Price control and other government regulations tended to perpetuate conditions of previous years when distress gas was purchased at distress

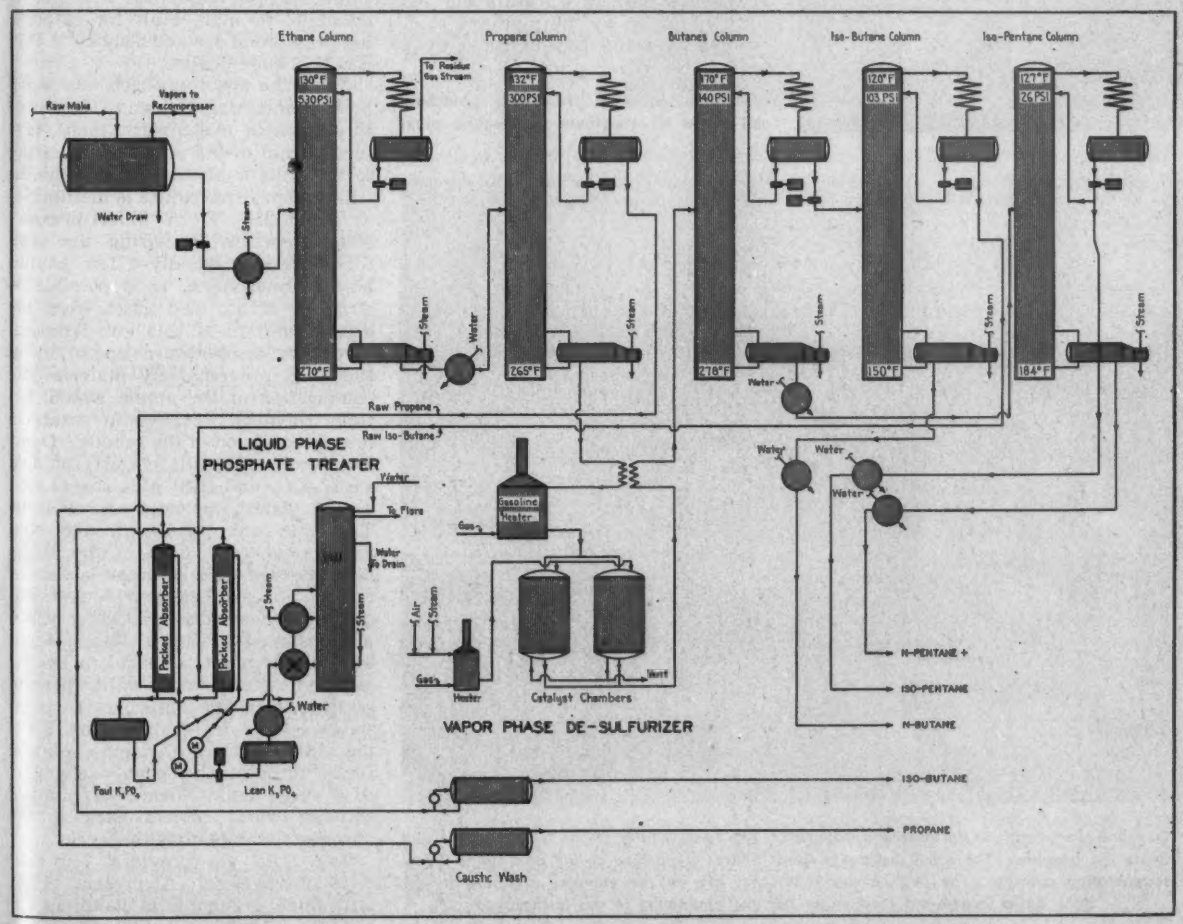
prices and without regard to quality

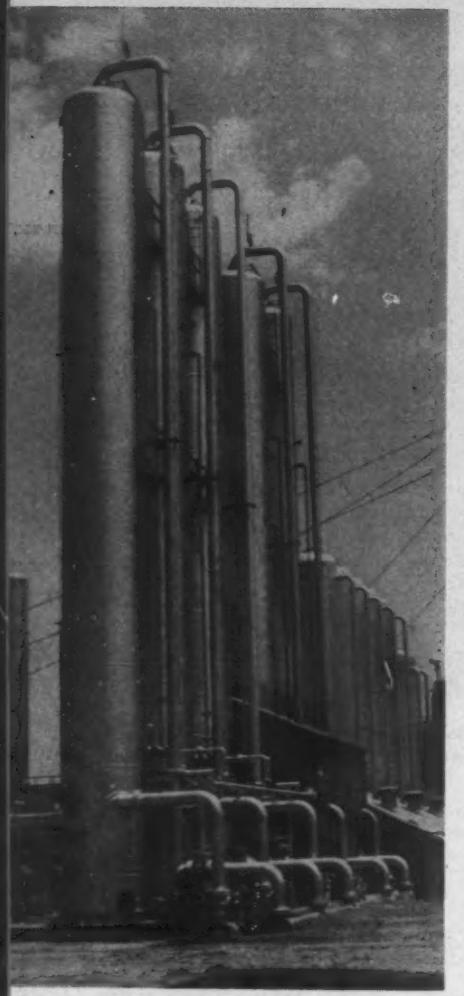
Starting in the fall of 1943, when the American synthetic-rubber industry began to reach high production levels, demand for carbon black exceeded productive capacity. Also, quality requirements (for use with synthetic rubber) became much more exacting. As a result of these factors there were eventual changes in the carbon-black industry which made it possible to buy gas on a quality basis, and to protect the future of the industry by paying prices in general competitive with the value of the gas in other markets.

These changes in the carbon-black gas market became broadly effective starting with October 1945, or just about the same time that other demands for gas (and for L.P.G.) began to respond to the relaxation of wartime regulations. Keeping abreast of these changes, Shamrock negotiated gas sales with utility pipe lines, and revised its contracts with its carbon-black customers. These new and revised contracts provide—as to quality of the gas—removal of sulfur, and control (within limits) of the heating value. Control of the heating value is largely a matter of maintaining

A portion of the gasoline plant apparatus showing the new primary deethanizer in center foreground

Shamrock uses the processes below to improve natural gasoline and L.P.G. qualities: Catalytic vapor-phase desulfurization is applied to the depropanized product. Propane and isobutane have H_2S removed in the liquid-phase phosphate and caustic treater





The author joined Shell Oil Co., Inc., in refinery construction in 1926. From 1931 to 1934 he was chief technologist for Shell at the East Chicago, Ind., refinery. At New York, in 1934, he became technical assistant to the vice president. In 1936 he was placed in charge of the company's laboratories and technical activities related to marketing operations along the eastern seaboard. In 1938 he became manager of Mid-Continent area natural-gas and natural-gasoline operations. In 1946, after a period as an independent consultant, he joined Shamrock as special assistant to the president. He received his education in chemical engineering at Notre Dame and Columbia.

proper operating conditions and checking by the use of recording calorimeters, of which three have been installed.

Gas Purification

Reduction of the hydrogen sulfide to the low limit of 0.5 grain per 100 cu. ft. required by the pipe-line sales contract is being accomplished by a large Girbotol plant, the first units of which have been in operation since August 1946. Specifications and a brief description of this plant follow.

Left: View showing five amine absorbers and seven oil absorbers in gasoline plant

The sour residue gas leaves the oil absorbers of the gasoline plant at a pressure of about 210 psig. with a hydrogen sulfide content of about 180 grains per 100 cu. ft. It passes through mist extractor sections in the base of the amine absorbers, to remove any traces of absorption oil which otherwise might cause foaming and loss of the expensive amine solution. The gas next passes through 23 bubble trays in counter-current contact with the amine solution which removes the hydrogen sulfide and a small amount of CO_2 present in the gas. Mist-extractor equipment is provided at the top of the absorbers to prevent loss of solution by carryover. The 15 per cent monoethanolamine solution is fed into the absorbers on the fourth tray (from top). A small stream of water is fed to the top tray to reabsorb M.E.A. vapors from the gas. It may be seen from the foregoing remarks that elaborate precautions have been taken to prevent loss of this chemical.

At present there are three absorbers having a combined capacity of about 150,000 M.c.f. per day under present operating pressure of 200 lb. Three more absorbers are being installed. These vessels are 7 ft. i.d. by about 68 ft. high, built for a working pressure of 250 and 300 psi., A.P.I.-A.S.M.E. code design.

From the absorbers rich amine solution containing H_2S and CO_2 passes through heat exchangers, then via a surge drum to the stills. Temperature to the stills is about 200° F., and the still bottom temperature is maintained at about 250° F. by a low-pressure steam reboiler. By sizing the stills for a pressure of only a few pounds above atmospheric, it is possible to strip all of the acid gases from the amine solution at this low temperature. Low-temperature operation of the stills prevents any material decomposition of the amine which, besides chemical loss, would result in serious corrosion of the reboiler. Overhead from the stills consists of acid gases (CO_2 and H_2S) plus steam generated from the aqueous solution. This overhead passes through condensers whereby most of the steam is condensed and returned as water reflux. The acid gases with an equilibrium concentration of water vapor are disposed of in a flare. Water loss at this point is made up by the small streams of wash water injected at the top of the absorbers as mentioned earlier in this discussion. From the stills the stripped amine solution flows through the heat exchangers to a surge tank. Then it is pumped through water coolers back to the absorbers, completing the cycle.

Two stills are provided 7 ft. i.d. with 20 trays each. At present, either still alone is capable of handling the

Gasoline-plant catalytic desulfurizing apparatus. The large heater at the left vaporizes and heats the gasoline. The small heater is used to heat a mixture of air and steam when regenerating catalyst. The two catalyst chambers are on the elevated structure at the right. Boiler house and feed water treating equipment in the background

load. With five absorbers eventually in use, both stills will be in service. A low-pressure steam reboiler is provided for each still. High-pressure steam reboilers are also provided in each for emergency spare operation. For reasons already indicated, this type of reboiler is not desirable for continuous operation. The stills are designed for a maximum operating pressure of 50 psi. according to A.P.I.-A.S.M.E. code with ⅛-in. corrosion allowance.

As this plant is intended primarily for purifying gas for utility pipe lines, considerable thought was given to assuring continuous operation. Besides the spare reboilers already mentioned, heat exchangers and coolers were installed in small multiple units so that these might be cleaned or repaired, one at a time, without a complete plant shutdown. Spare pumps are provided for solution circulation and still reflux, also for the raw-water circulation over the solution cooling sections.

Plant instrumentation is, in general, conventional. Liquid-level controls are provided for the stills, absorbers, and rich solution surge tank. Amine solution flow to the absorbers is controlled by proportioning rate of flow controllers actuated by the gas volumes to each absorber. Makeup water streams over the top of the absorbers are metered with rotameters. Still-bottom temperature is regulated by an automatic controller which varies the steam pressure to the reboiler. A back-pressure regulator on the waste gas stream to the flare controls still pressure. Flow indicators are provided for balancing solution load between the two stills. Still-top temperatures are recorded for operating control and information. Indicating pressure gages, and thermometers are provided at numerous points for operating conveniences.

Essential operating conditions and results of the Girbotol gas-treating unit are summarized below for a throughput of 65,000 to 100,000 M.c.f. per day, two absorbers in use:

Inlet H_2S content, gr. per 100 cu. ft.	160-180
Inlet CO_2 content, per cent by vol.	.3-.4
Outlet H_2S, gr. per 100 cu. ft.	.02-.3
Solution rate (17 per cent MEA), gal. per M.c.f. gas	2-3
Absorber pressure, psig.	200
Still pressure, psig.	12
Still temperature bottom, °F.	250
Still temperature top, °F.	240
Steam consumption,* lb. per M.c.f. gas	3.2
MEA makeup,* lb. per M.c.f. gas	.001

*Guaranteed maximum figures.

This Girbotol plant was installed by J. F. Pritchard & Co. of Kansas City, and is operated under process license of The Girdler Corp., Louisville.

Natural Gasoline

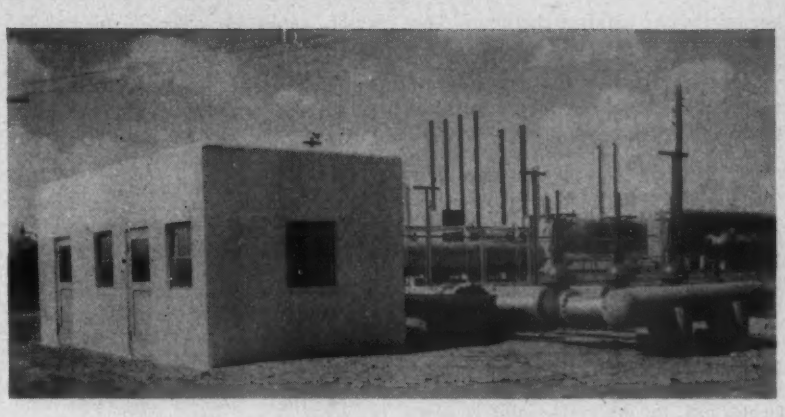
During war years, Shamrock segregated isopentane for aviation-gasoline blending. This product, as well as isobutane and a large amount of normal butane, were shipped to others for further blending and processing in the production of needed aviation gasoline and synthetic rubber. Considerable amounts of butane were thermally cracked to produce propylene which was used to manufacture cumene at Shamrock's refinery adjacent to its gasoline plant.

With the end of hostilities, these requirements were eliminated and simultaneously Shamrock found itself confronted with competitive requirements for higher-octane motor fuels. Considerable gain in octane could be effected by including the isopentane in motor-fuel blends, but it was deemed desirable to improve the antiknock quality of the normal pentane and heavier material. In anticipation of this problem, laboratory and semiplant scale experimental work had been started about 1 year before V-J Day. This work led to the conclusion that catalytic vapor-phase desulfurization would be the most satisfactory method of effecting a material improvement in the antiknock quality of the 10-lb. (isopentane-free natural gasoline.

In applying the process on a plant scale, consideration was given to increasing needs for L.P.G., and also to the existing setup for fractionating the raw gasoline. As may be seen from the flow sheet (Fig. 1 the desulfurizer functions on the depropanized gasoline, i.e., the combined isobutane and heavier is processed through the catalyst chambers. By this method, most of the H_2S present in the raw gasoline is eliminated ahead of the desulfurizer so that it will not affect adversely the chemical decomposition of higher-sulfur compounds which yield H_2S. Also, the depropanizer pressure could be utilized in place of pumping the liquid stream to the desulfurizer equipment.

Finally, this process improved the quality of the butanes, in that after subsequent fractionation, these contained no traces of mercaptan sulfur. As may be seen from the flow sheet, the desulfurized stream is fractionated to yield isobutane, normal butane, isopentane, and normal pentanes plus heavier. The isobutane requires a light alkaline wash to remove H_2S which results from decomposition of higher-sulfur compounds and which concentrates in this comparatively small volume of product. With this treatment, all products are doctor sweet, corrosion negative, and very low in sulfur and gum, requiring no further chemical treatment.

The essential items of equipment in the desulfurizer proper are the



Above: Exterior view of meter house for gas deliveries to a large pipe-line company showing meter runs to the rear of the meter house

Right: Interior view of meter house for pipe-line gas deliveries showing, left to right, calorimeter recorder, recording gravity meter, and flow-meter gages

heater and the catalyst chambers. The heater is a Petrochem vertical unit designed for a total heat input of 7,500,000 B.t.u. per hour. The vertical tubes are arranged in two parallel passes to minimize pressure drop which would otherwise be excessive considering the fact that the throughput is vaporized 100 per cent.

There are two catalyst chambers 8 ft. in diameter by 15 ft. tangent to tangent. These are used alternately to provide continuous operation while regenerating the catalyst. Approximately 18 tons of prepared bauxite catalyst is charged to each chamber. Each chamber is on stream for a continuous period of 21 days—about 80,000 bbl. throughput— and is then cut out for regeneration. The carbon is burned from the catalyst by a mixture of preheated steam and air, the latter serving as a diluent to control the rate of burning so that the catalyst and the apparatus are not damaged by excessive temperatures. It should be mentioned that the catalyst chambers are lined with about 6 in. of monolithic refractory to protect the metal. Thermocouples are provided at intervals from top to bottom to check the progress of the burnout, and so that the operator may maintain temperature within proper limits. The steam-air mixture is preheated in a small tube still of 5,000,000 B.t.u. per hour capacity.

Essential operating conditions and results of the desulfurizer are listed as follows:

Throughput, bbl. per day		3,800-4,100
Pressures, psi.:	In	Out
Furnace	290	230
Catalyst chamber	225	160
Temperatures, °F.:		
Furnace	...	750-800
Catalyst chamber	725-760	725-760
Throughput per ton of catalyst per hour, bbl.		9.5

Properties of feed and product:
Basis 10-lb. gasoline after removal of isopentane and lighter.

	Conventional sweetening	Desulfurization
Doctor test	Neg.	Neg.
Corrosion	Neg.	Neg.
Sulfur, per cent	.06	.003
Octane, A.S.T.M., clear	63.0	63.0
Plus 1 cc. TEL	68.6	73.0
Plus 2 cc. TEL	72.5	80.3
Plus 3 cc. TEL	74.8	82.5

The foregoing data compare the quality of the 10-lb. natural gasoline fractionated from the desulfurized stock with similar material previously treated by one of the conventional processes, which oxidize mercaptans to produce other sulfur compounds which remain in the gasoline. The increase in lead response is outstanding considering the relatively small sulfur content of the conventional stock.

Much of the benefit of desulfurization in improved lead susceptibility is lost if the product is blended with conventionally treated fractions from other sources. For this reason, and because of the direct improvement which could be effected in its refinery fractions, Shamrock's program included the installation of somewhat similar desulfurization units for processing cracked and straightrun gasoline produced in its refinery from Moore and Hutchinson counties sour crude oil.

These refinery facilities are fundamentally the same as the gasoline plant unit just described but differ somewhat in design detail and operating conditions. The leaded octane of the straightrun and cracked gasoline are increased about six and three numbers respectively, and subsequent chemical treatment is materially simplified and reduced in cast. The straightrun desulfurization facilities have also been used to produce a good-quality kerosine. Heretofore it had not been considered possible to refine an acceptable kerosine from this sour crude at reasonable costs.

Desulfurization units were installed by Shamrock's construction crew, and are operated under patent license of the Perco Division of Phillips Petroleum Co.

Liquefied Petroleum Gas

With ample butane available from the fractionation of natural gasoline, the most important problem was to secure adequate recovery of propane meeting quality requirements. Formerly small amounts of propane had been recovered from the gasoline-plant depropanizer tops. A small deethanizer was used to remove ethane from this product, and it was finished with a caustic wash. Recovery in this manner was limited to whatever could be condensed from the depropanizer overhead. A considerable volume of propane absorbed from the gas was lost at this point, and the small deethanizer was inefficient and contributed further losses.

In order to retain a larger portion of the propanes absorbed a large deethanizer capable of processing the entire raw make of the gasoline plant was installed. Aside from the size of the column the important change here is that the ethane and methane are discarded before the propane is separated. This is very effective in reducing the loss of propane as noncondensable vapors.

The total raw make is fed by a high-pressure, close-clearance pump through an exhaust steam preheater to the deethanizer column at about the midpoint. Overhead consisting mainly of methane and ethane goes to residue gas. Bottoms pass through a cooler to the depropanizer column. The ethane column operates at a reflux ratio of about 3.2 to 1.0 on overhead and necessary heat is supplied by a reboiler using steam at 125 psig. Condensation of reflux is by open sections in a conventional cooling tower. It was felt that the slight additional recovery to be effected by refrigeration of the overhead would not justify the cost. However, refrigeration can be added later if changed conditions should justify it.

Essential operating conditions and results of the new primary deethanizer are as follows:

Total feed, gal. per day	250,000
Pressure, psig.	510
Temperatures:	
Feed, °F.	200
Bottoms, °F.	270
Overhead, °F.	140
Reflux ratio:	
On overhead	3.2
On feed	.48

Mol (%)	Feed	Analyses Bottoms	Overhead
C_1	4.87	....	32.8
C_2	8.26	0.50	52.3
C_3	30.51	33.30	14.9
LC_4	8.26	9.70	....
NC_4	29.24	34.30	....
LC_5	6.57	7.70	....
NC_5	7.42	8.80	....
C_{6+}	4.87	5.70	....
Total	100.00	100.00	100.0
Total mols	21,809	18,411	3,398
Liquid propane recovery		92.5%	

The foregoing figures represent design conditions. Actual operation at feed rates up to 10 per cent in excess of design has shown satisfactory efficiency with propane content of the overhead about 14 per cent.

Propane and isobutane are treated for removal of H_2S in a liquid-phase scrubbing plant using tripotassium phosphate in the first stage and a caustic soda in the second. The phosphate stage is a continuous regenerative process which economically removes the bulk of the H_2S. Only traces remain to be removed in the second or caustic stage, and the small amount of caustic solution used is discarded when spent. The propane is finished by drying with Florite so as to provide a product of very low water content suitable for trouble-free service in domestic installations.

To outline this phase of the L.P.G. operations in greater detail. The propane is contacted with K_3PO_4 solution of about 42 per cent concentration in a packed (Raschig rings) absorber. Amount of solution circulated will depend on the H_2S content of the propane, for comparatively high H_2S of 500 to 1,000 grains per 100 cu. ft. vapor equivalent about 30 gal. of solution per barrel of propane is needed. The foul H_2S-bearing solution is stripped continuously in a bubble plate still using open steam as a stripping medium and source of heat. Open water reflux is used in the still. The top four trays serve as a reflux condensing section and the warm cooling water augmented by condensed steam from the stripping section is drawn off from a blind chimney tray just below these four upper trays. The still operates at about 15 psig. with a bottom temperature of 265° F. and top temperature of 110°-120° F. Waste H_2S from the still is burned in a flare. The cycle includes conventional heat exchange between the hot

stripped solution, and the foul solution being fed to the still. Final cooling of the stripped solution is done with water in G-fin sections. A separate absorber is provided for isobutane, and the circulating stream is divided between the two absorbers as may be required by relative volumes and H_2S contents of the propane and isobutane.

The caustic stage of the H_2S-removal system is conventional. Centrifugal pumps are used to contact the propane and butane streams with NaOH solution continuously drawn from large settling drums. The streams of mixed caustic and propane or isobutane pass from the pumps into the settling drums. From these the purified hydrocarbons are drawn off continuously and the settled caustic passes back to the pump suctions.

The drying system previously mentioned consists of two 3 by 15-ft. vessels suitable for operation at 250 psig. and 400° F. Each of these is charged with an 11-ft. bed of Florite desiccant, having sufficient water-absorbing capacity for a normal 24-hour run of 1,000 bbl. of propane. While one dryer is in operation the other is regenerated by a stream of hot gas at 350° F. and 200 psig. Live steam is used to heat this gas in a shell-and-tube heater. The moisture-laden hot gas is cooled in another shell-and-tube unit and after trapping off the separated water, is returned to the plant fuel system.

Throughput of the liquid-phase H_2S-removal plant is:

Propane 1,500 bbl. per day.
Isobutane 500 bbl. per day.

The raw streams carry from 50 to 1,000 grains of H_2S per 100 cu. ft. vapor equivalent. This is reduced in the phosphate stage to 1-10 grains and to zero concentration in the final caustic stage. In considering these operating results it should be noted this portion of the apparatus is operpane section of the phosphate treater was only 1,000 bbl. per day, so that that portion of the apparatus is operating at about 50 per cent overload. The phosphate treater was designed by J. F. Pritchard Co. and is operated under patent license of Shell Development Co.

New Texas Co. Terminal To Start Operation Sept. 15

The Texas Co.'s new terminal on Harbor Island, Seattle, will be in operation by September 15. It covers 20 acres and will provide storage space for 22,000,000 gal.

The new terminal, which includes a 600-ft. pier operated jointly by The Texas Co. and General Petroleum Corp., will replace the former terminal at Smith Cove, taken over by the Navy during the war.

Front view of the novel display board

Display Board at Camp Entrance

A NOVEL display board distinguishes the entrance to Sunray Oil Corp.'s Gilmore Camp, warehouse, and southern Oklahoma division office, 2½ miles west of Allen, Okla.

C. C. SHREVE

The idea for the entrance was conceived by Sunray's division superintendent, C. C. Shreve, who wanted to eliminate the old-time standard oil-field entranceway of two posts with a sign across the top. Shreve has been with Sunray since early in 1936.

The front of the board, as can be seen in the photograph above, displays the Sunray shield, gives the land description of the property, and lists the Sunray installations on the property. In addition, a number of obsolete oil-field tools and pieces of equipment have been mounted on the lower portion of the board. The board is illuminated at night by flood lights.

On the backs of panels are safety signs which can be seen in the photograph below.

The entranceway is built of 8⅝-in. o.d. casing, tank iron, and 2-in. pipe. Shreve collected the obsolete tools and equipment over a period of several years with the idea in mind of some day building a panel of this type.

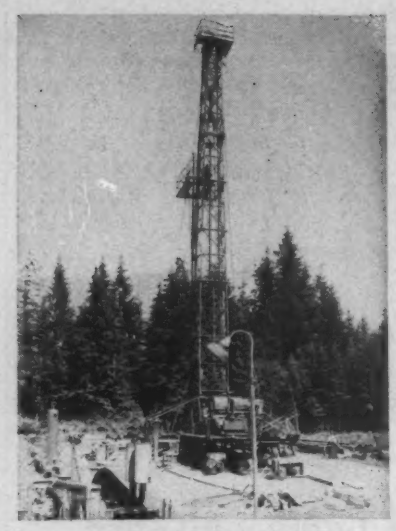
The southern division office supervises Sunray properties at Allen, Fittstown, Bebee, Konawa, Sasakwa, Seminole, Earlsboro, Okemah, Cromwell, and Shawnee, Okla.

The safety slogans used on the panel are "Practice, Think, Talk—Safety," and "Think—Drive Carefully." In addition to the slogans, the Sunray shield is painted on each side of the entranceway.

An obsolete rotary-drilling bit is positioned in the top of the casing uprights which form the mainstays of the display board.

Rear view of the display-board entranceway

Union Oil Plans Large Program Of Exploration in Washington State



View of Union Oil Co. of California 1 Phoebe Parker et al., in SE 18-19n-11w, 15 miles northwest of Hoquiam, Wash. The test was spudded July 16 and completed August 2, at total depth of 1,912 ft. Drilling contractor was Fillmore Drilling Co., Bakersfield, Calif.

WITH several million dollars earmarked for exploratory work in Washington, Union Oil Co. of California has spudded in the second of 10 test wells in the Grays Harbor and Olympic Peninsula areas. The first, Union Oil 1 Phoebe Parker et al, near Carlisle, was dry at a depth of 1,912 ft. because of badly faulted formation. The second is being drilled in the sand dunes about a half mile from the Pacific Ocean shoreline at Oyehut, Grays Harbor County.

Fillmore Drilling Co., Bakersfield, Calif., is doing the test drilling for Union, using heavy portable equipment.

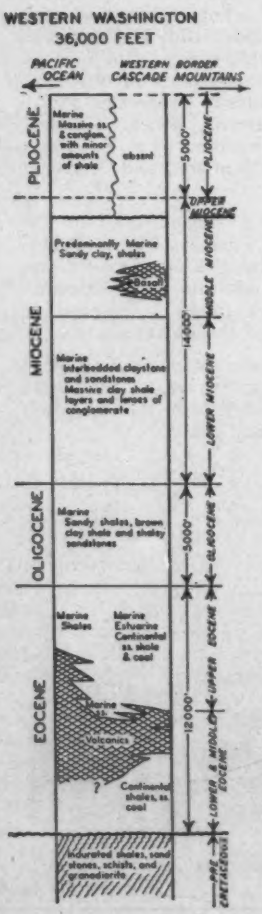
Union has 200,000 acres under lease in western Washington, according to E. W. Morgan, the company's division manager of lands for Washington and Oregon. The bulk of the leased property is in Grays Harbor County.

The Grays Harbor area is considered a very likely oil-producing section because of the Oligocene and lower Miocene organic shales present. Some high-gravity oil is being produced from Miocene and Oligocene sediments on Hoh River, on the western side of Olympic Peninsula. Strong gas odors come out of the ground in many places from Grays Harbor north nearly to Cape Flattery.

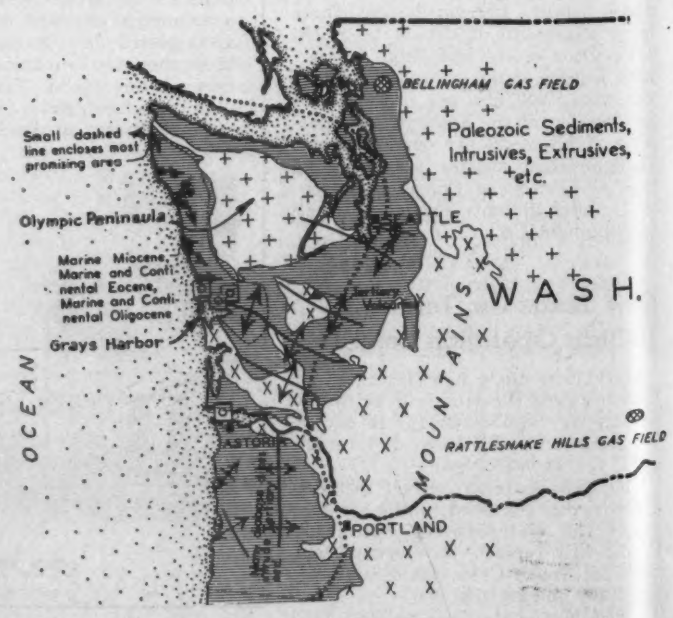
W. W. Heathman (in left foreground), manager of field operations, Union Oil Co., and M. J. Fillmore, drilling contractor, watch operations at Union Oil's initial test well in Grays Harbor County, Washington

Union, according to W. M. Heathman, manager of field operations, has spent close to $500,000 in geological studies in the western part of the state and is prepared to make a thorough test for oil possibilities. Seismograph crews worked in the coastal area for several months of spring and early summer.

Two tests are planned for the Oyehut area, one to 2,000 ft., the other to 3,000 ft., and to be deeper if indications warrant.



Left: Generalized geologic column of western Washington. (From "Possible Future Oil Provinces of the United States and Canada," edited by A. I. Levorsen, The American Association of Petroleum Geologists)



Right: General geologic features in western Washington. (From "Possible Future Oil Provinces of the United States and Canada," edited by A. I. Levorsen, The American Association of Petroleum Geologists)

QUESTIONS on TECHNOLOGY

by W. L. Nelson

Consulting Engineer

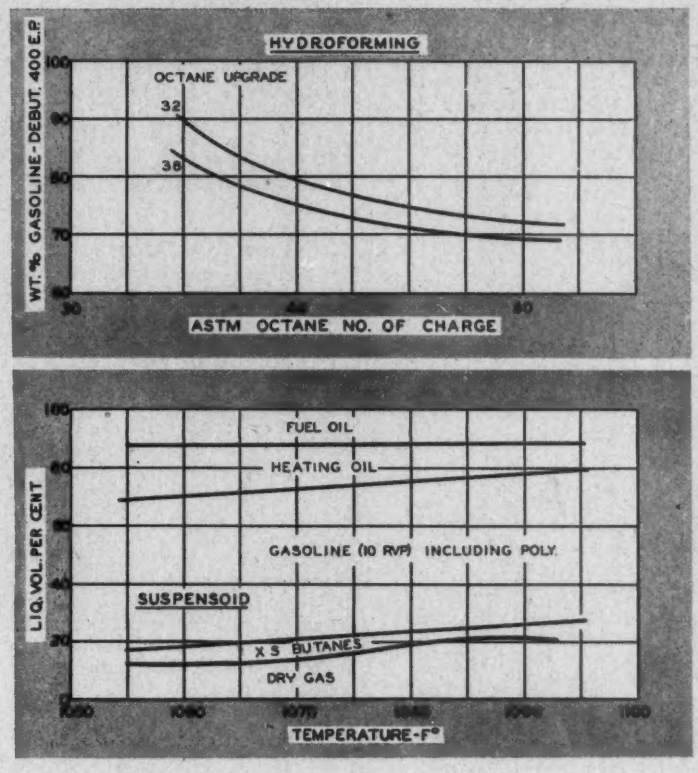
Yields in Catalytic Cracking

What yields can be expected by the catalytic cracking processes and what is the effect of recycling? We are a small refiner and need to know how to get our capacity up by recycling to the size of catalytic crackers.—F. C. E.

The only way to get accurate yield information is to go directly to the promoters of the various processes. However, and as a most general guide to the situation, Figs. 1 and 2 shown here are average once-through yields computed from the trade literature. A direct comparison of these yields with one another should not be made, however, because the conditions under which they were obtained are not entirely comparable. Nor should gas production be looked upon as a loss because about 60 per cent of the gas can be recovered as B-B (four-carbon-atom hydrocarbons) cut. Thus, if the total yield of liquid products including gasoline, B-B, and cracked distillate are compared, the results are somewhat as shown in Table 1.

Examination of table 1 shows that there is really little difference between the processes with respect to total yield, that the differences are within the experimental limits, or the limits of the trade literature consulted.

Yields are almost totally a function of the "per cent conversion," and in general the approximate yields in the range of 40 to 65 per cent conversion, in mathematical forms are:



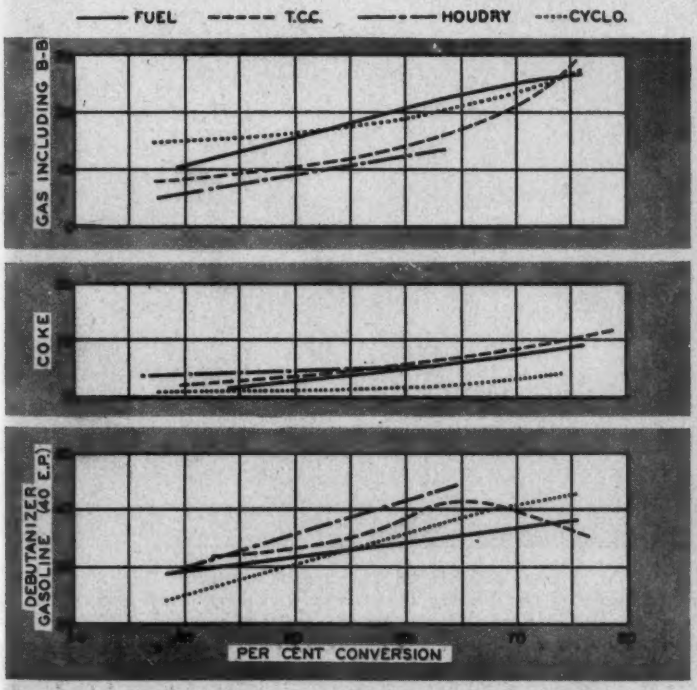


Fig. 1—(Left) Catalytic cracking yields, once through, weight per cent. Fig. 2—(Above) Some yield data in hydroforming and Suspensoid cracking

B-B cut = 0.25C — 4.4
Debutanized 400-e.p. gaso. = 8 + 0.5C
Total gas = 0.4C — 7.0

in which "C" is the percentage conversion.

The gravity of the charge stock within the normal ranges of gravity of 22°-35° A.P.I. has little effect on the yields although a slight increase in yield is indicated in a few instances for the higher-gravity stocks. On a liquid-volume-per cent basis the low-gravity stocks indicate slightly larger yields and slightly better octane numbers. The gravity of the distillate or cycle stock is about the same or occasionally three A.P.I. units lower than that of the gas-oil charge stock.

Little is reported in the literature on the yields by Hydroforming and by Suspensoid cracking but some indication of the yields by these processes is given in Fig. 2. Hydro-

TABLE 1—APPROXIMATE YIELDS (WEIGHT PER CENT) BY CONVENTIONAL CATALYTIC CRACKING PROCESSES (1944-46)

	40 per cent conversion				55 per cent conversion				70 per cent conversion*			
	Fluid	T.C.C.	Houdry	Cyclo.	Fluid	T.C.C.	Houdry	Cyclo.	Fluid	T.C.C.	Houdry	Cyclo.
B-B Cut	6	5	4	9	11	7	6	10	15	13	..	14
Debutanized 400-e.p. gasoline	29	32	30	25	33	35	39	33	37	40	..	41
Cycle oil	60	60	60	60	45	45	45	45	30	30	30	30
Total liquids	95	97	94	94	89	87	90	88	82	83	..	85

*Extrapolated in part and generally not as accurate as the other figures.

forming is a reforming process and hence yields are large. The data on Suspensoid cracking (Fig. 2) are in liquid volume per cent (rather than weight per cent) and the vertical scale is cumulative percentage. Thus, at 1,080° F. the yield of gas, excess butanes, and 10-R.v.p. gasoline is 75 per cent—of which 19 per cent is gas, 5 per cent is butanes, and 51 per cent is gasoline. The charge stock to the Suspensoid process (Fig. 2) was a mixture of heavy naphtha and gas oils which when mixed had a gravity of about 39° A.P.I. The Suspensoid gasoline yields include poly gasoline whereas the yields for other processes do not include poly gasoline. The olefin content of the propane cut is about 70 per cent and that the butane cut about 55 per cent.

Recycling is not very effective. Complete data are apparently not available but in general the yields appear to approach about 60 per cent of gasoline, and all of the remaining material is coke, gas, and B-B. The coke approaches 13-16 per cent, the B-B 14-17 per cent, and the dry gas about 15-21 per cent.

The yields were taken from the following references:

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19. Nelson, W. L., Catalytic Cracking and the Small Refiner, The Oil and Gas Journal, October 7, 1944, p. 90.

Richfield to Build "Unitized Camp"

AN unusually well-designed installation for an oil-field "camp" is planned for the projected Richfield Oil Corp. camp at Bakersfield, Calif.

Six buildings make up the Richfield installation, which has a total floor space of 43,649 sq. ft. These buildings are: a main office; general warehouse and drill tool storage building; warehouse, garage, and field office building; welding shop; a combined machine shop, cleaning rack, and dressing room for field help; and a general garage. (See picture.)

A departure from the usual field headquarters was incorporated into the plans by making room in the main office building for a canteen for soft drinks and a small auditorium to seat about 75 people. The entire camp is air-conditioned.

The Latisteel method will be used for construction, and Russell & Samaniego, Los Angeles, are the architects. The construction combines expanded light steel with concrete to give fire-resistant and earthquake-proof structures. Some 70-80 per cent of the construction is fabricated in the shop while floor slabs and footings are being laid.

Briefly, the method calls for the use of building units, or modules, formed of vertical and horizontal members of expanded, light steel, studs, angles, and channel sections on which Latisteel fabric is welded to give lateral strength and form reinforcement for the extension concrete finish.

These units are then laid flat on a smooth portable surface and concrete poured to form a "skin" or outer wall. Later, these panels are lifted into place and anchored to bolts preset in the foundation. Then panels are bolted together and the joints filled.

Roof trusses are hoisted into place, bolted and welded. On them, roof decking formed of U-shaped, interlocking steel planks is welded, later to be covered with insulating material and composition roofing.

A model of the projected Richfield Oil Co. camp at Bakersfield, Calif. Numbers in the picture correspond to the following installations: (1) Geologist and geophysicist offices. (2) Auditorium and canteen. (3) Production and engineering offices. (4) Drill-tool storage. (5) General warehouse. (6) Warehouse, garage, and shop offices. (7) Garage. (8) Welding shop. (9) Cleaning racks. (10) Machine shop. (11) Field-crew dressing room and showers

Western Canada

IN MIDST OF MAJOR EXPLORATION, DEVELOPMENT PROGRAM—

Gager and pumper perform their duties at initial stock tank battery set up to handle Leduc production

by Leigh S. McCaslin, Jr.

A MAJOR exploration and development program is currently under way in Western Canada—stemming from the discovery of oil last February near the prairie town of Leduc, 16 miles south of Edmonton, Alberta. Discovery credit goes to Imperial Oil, Ltd., Canadian affiliate of Standard Oil Co. (N.J.), who brought in 1 Leduc, February 13, with an initial flow of 788 bbl. daily of 36.7°-gravity crude oil from a Devonian limestone zone at 5,029-66 ft.

Imperial officials, although optimistic, were cautious in evaluating the importance of this discovery during the immediate period following the discovery. However, there can no longer be any doubt. Eight producers defining an area roughly 1½ by 3½ miles have now been brought in, proving the existence of a major field.

This important new oil source has come at an opportune moment in Canada's oil history. Canadian production hit a peak of 10,643,000 bbl. in 1943 and has declined steadily since that time, producing at the annual rate of only 5,940,000 bbl. thus far in 1947. This production is sufficient at present to care for only 10 per cent of the country's crude requirements. To make up the deficiency crude is imported, primarily from the United States, with high transportation costs which adversely affect the country's economy. Montana crude costs 70 cents a barrel in rail charges to Alberta province, Wyoming crude $1.73, Oklahoma $2.63, and Panhandle and East Texas $2.73.

Heretofore, the mainstay of Canadian production has been Turner Valley field, southwest of Leduc in the foothills of the Canadian Rockies. This field hit a peak production figure of 9,701,719 bbl. in 1942 and declined to 5,937,362 bbl. last year. Leduc is expected to make up this deficiency and possibly out-produce Turner Valley.

Some conception of the major importance of Leduc and the intensive exploration and development program sparked by it can be obtained from the following: (1) At the time of discovery, lease and reservation holdings in the Leduc region totaled under 2,000,000 acres. There are now more than 10,000,000 acres in holdings in a block approximately 300 miles in length and up to 150 miles in width. (2) Oil companies will spend an estimated $20,000,000 in 1947 for exploration. (3) Imperial Oil, Ltd., is moving the Canol refinery at White Horse, Yukon Territory, to a site near Edmonton to process crude from Leduc field. (4) Imperial has indicated that it plans to drill 21 wells in Leduc field this year. (5) Thirteen rank wildcats are presently under way in the Leduc region.

Geology

The accompanying map [from The Lamp, Standard Oil Co. (N.J.) publication] shows the basins of prehistoric seas which are considered by geologists as likely places for finding oil in North America. A large portion of this area in the United States has, of course, already been proven. However, as can be seen, a relatively small portion of the Canadian basin is now producing oil. The Lamp describes the general geology of this area thus: "At the southern end of this basin, Texas draws much of its oil and gas from sedimentary rocks which are relatively young, having been deposited some 75 millions years ago. Colorado, Nebraska, Iowa, Wyoming, the Dakotas, Montana, and the whole of the Canadian basin are underlain by older sediments deposited perhaps 300 or 400 million years ago. Canada has thus the same sediments and about the same enormous extent of them as all the seven

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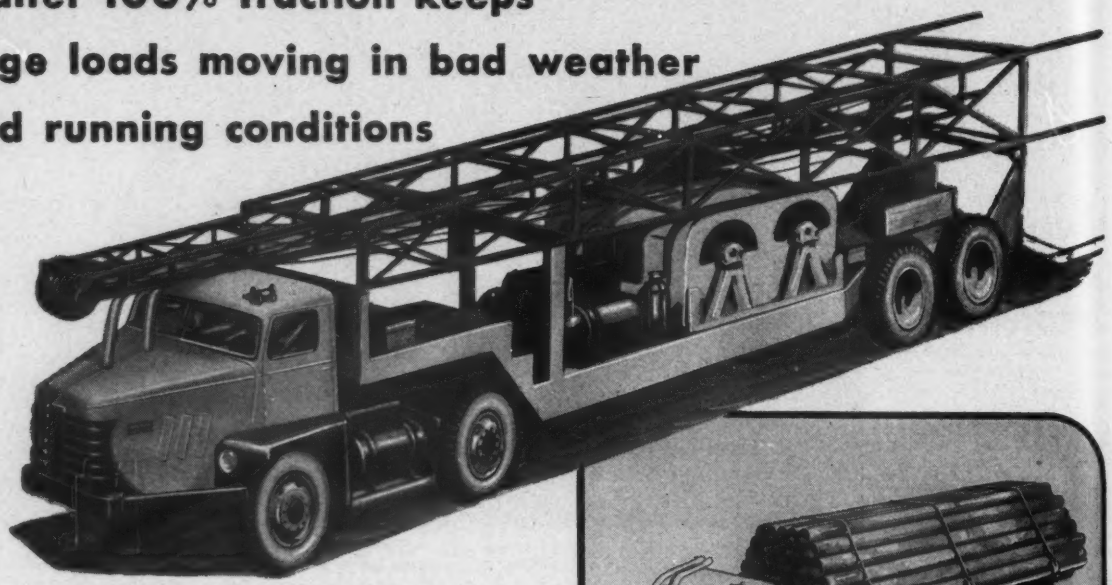

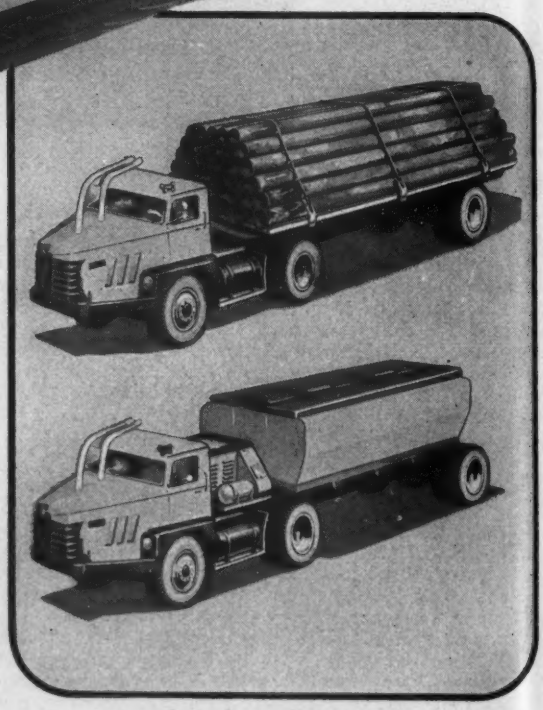

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states south of the international boundary.

"But in these seven states, 15,600 test wells have established 1½ billion barrels of proved reserves, mainly in Montana and Wyoming, with some in Colorado and Nebraska; while in the basin north of the boundary 1,600 test wells have led to production and reserves which together come to only 164,000,000 bbl. And yet there is no reason in geology why 15,000 test wells in the Canadian west should not duplicate the 1½ billion barrels of reserves which have been established south of the boundary.

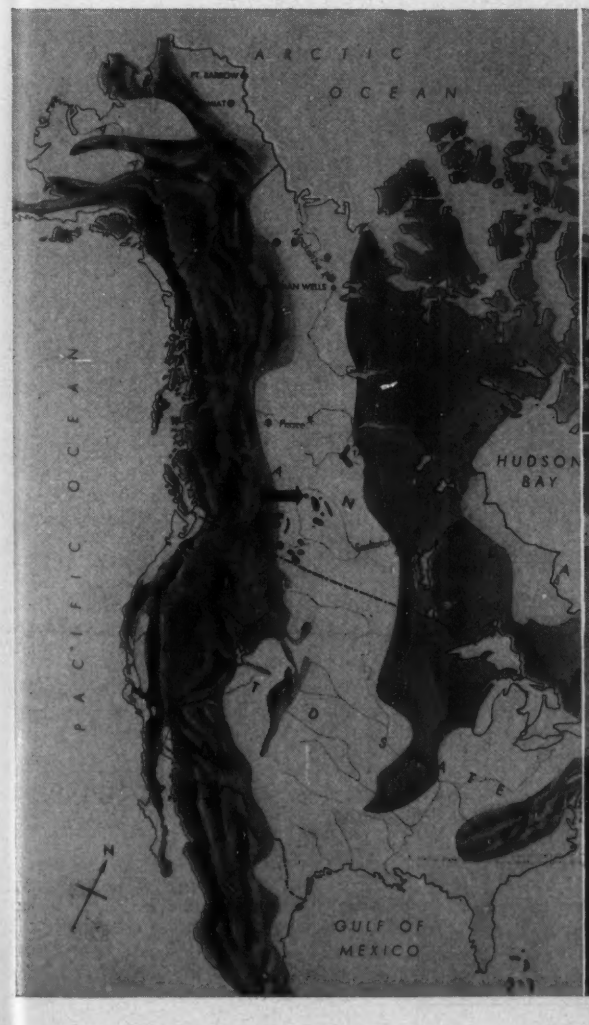
"The largest surface show of oil in the world, the 10,000 sq. miles of the famous Athabaska tar sands (see The Oil and Gas Journal issue of June 21, pages 78-79) lies on the eastern border of the Canadian basin. Estimates which place the oil content of the tar sands at the fabulous figure of 100 billion barrels take no account of the difficulties of recovering and refining this bitumen-like crude. Because it will not flow, it has to be mined; and due to its high sulfur content and its deficiency in hydrogen, it is difficult to refine it into the light products which are in greatest demand.

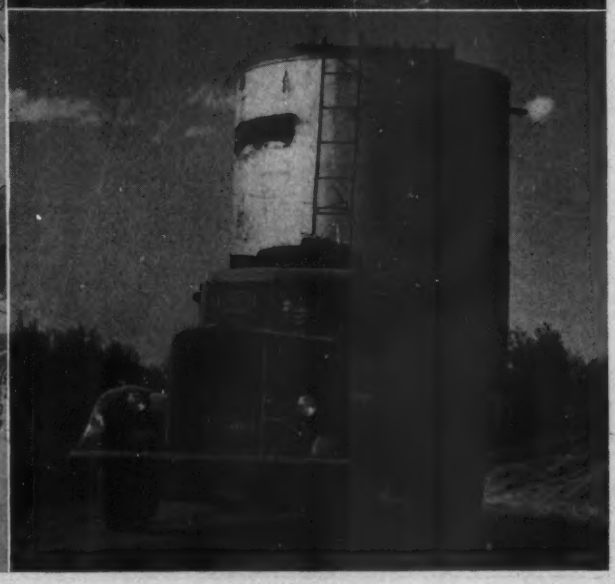
"From the tar sands on the surface, the sedimentary rocks slope gently down to the western sides of the plains where they are broken by the violent upthrust of the Canadian Rockies. Here in the foothills, the Turner Valley wells go down to some 8,000 ft. to tap the oil and gas-bearing sediments."

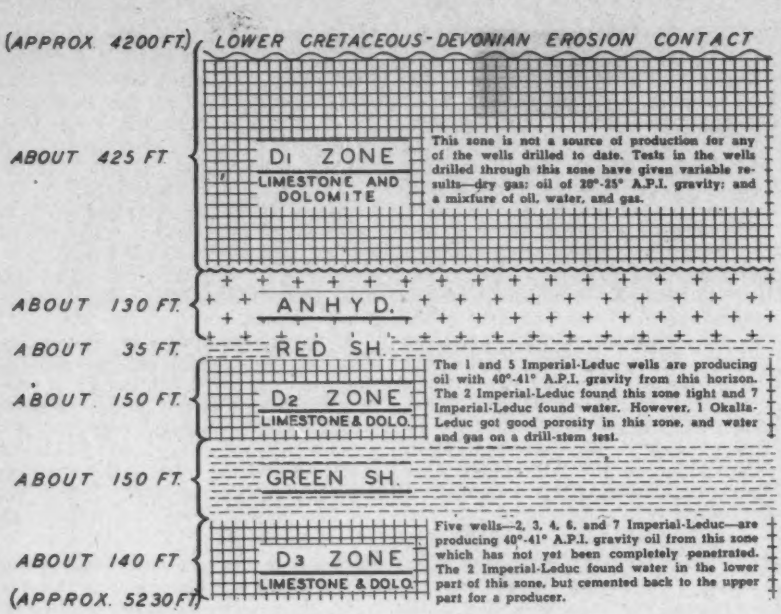
The 1 Leduc is the first encouraging well drilled in the Alberta syncline which occupies the deepest part of the Canadian basin bounded on the west by the Rocky Mountains and on the east by the pre-Cambrian shield. It is the first well in the northern plains area in which drilling has been carried to the Devonian limestone. Production of oil and gas in east-central Alberta areas has heretofore come from Cretaceous formations just above or below 2,000 ft. Leduc is 174 miles north of Calgary and some 200 miles northwest of Steveville-Princess field, where some production has been found in the Devonian at shallower depths.

With the exception of Steveville-Princess field, previous oil fields in the plains area of Alberta have produced low-gravity crudes ranging from 14°-25° A.P.I. These heavier crudes do not give high yields of gasoline and the other light products needed for the agricultural economy of the plains. These heavier crudes

Left: The white areas on this map of North America mark the basins of prehistoric seas whose sedimentary rock yields much of our oil and gas. Producing fields and seepages are shown in the Canadian portion of the main chain of basins and seepages in the Alaskan portion. (C. O. Willson, editor of The Oil and Gas Journal, recently returned from a trip to Alaska and covered exploration developments in the Point Barrow region in a series of three articles commencing in the August 9 issue of the Journal.) Photo courtesy Standard Oil Co. (N. J.). Right, top: Driller checks core bit after 40 hours of drilling on one of the early Imperial wells. Right, below: All types of makeshift tanker trucks are pressed into service to transport Leduc crude to the railhead at Nisku, 6 miles from the field Photo courtesy Imperial Oil, Ltd.






(APPROX. 4200 FT.)
LOWER CRETACEOUS-DEVONIAN EROSION CONTACT
ABOUT 425 FT.
D1 ZONE
LIMESTONE AND DOLOMITE
This zone is not a source of production for any of the wells drilled to date. Tests in the wells drilled through this zone have given variable results—dry gas; oil of 28°-25° A.P.I. gravity; and a mixture of oil, water, and gas.
ABOUT 130 FT.
ANHYD.
ABOUT 35 FT.
RED SH.
ABOUT 150 FT.
D2 ZONE
LIMESTONE & DOLO.
The 1 and 5 Imperial-Leduc wells are producing oil with 40°-41° A.P.I. gravity from this horizon. The 2 Imperial-Leduc found this zone tight and 7 Imperial-Leduc found water. However, 1 Okalta-Leduc got good porosity in this zone, and water and gas on a drill-stem test.
ABOUT 150 FT.
GREEN SH.
ABOUT 140 FT.
D3 ZONE
LIMESTONE & DOLO.
Five wells—2, 3, 4, 6, and 7 Imperial-Leduc—are producing 40°-41° A.P.I. gravity oil from this zone which has not yet been completely penetrated. The 2 Imperial-Leduc found water in the lower part of this zone, but cemented back to the upper part for a producer.
(APPROX. 5230 FT.)

Geologic cross-section of the Devonian limestone at Leduc. Imperial and other companies in the area label the three limestone strata, D1, D2, and D3

ACTIVE LOCATIONS IN LEDUC FIELD*

Well—	Location	Drilling Contractors
Imperial-Leduc 8	LSD 7, 26-50-26w4	Young Drilling Co.
Imperial-Leduc 11	LSD 9, 21-50-26w4	Commonwealth Drlg. Co.
Imperial-Leduc 12	LSD 12, 22-50-26w4	
Imperial-Leduc 13	LSD 4, 23-50-26w4	Drilling Contractors, Ltd.
Imperial-Leduc 14	LSD 9, 26-50-26w4	Drilling Contractors, Ltd.
British-American Pyrcz 1	LSD 2, 25-50-26w4	General Petroleums, Ltd.
East Leduc 1	LSD 10, 5-51-25w4	"Whitey" Wilson
E. Leduc-S. Brazeau 1	LSD 8, 9-50-26w4	Northern Development Co.
Globe-Leduc West 1	LSD 6, 19-50-26w4	Regent Drilling Co.
Globe-Leduc West 2	LSD 9, 34-50-26w4	Northern Development Co.
Homestead-Yaremko 1	LSD 7, 19-50-25w4	General Petroleums, Ltd.
Leduc Cons. Oils 1	LSD 10, 23-50-36w4	Union Drilling & Dev. Co.
Leduc Cons. Oils 2	LSD 7, 23-50-26w4	Union Drilling & Dev. Co.
Leduc Cons. Oils 3	LSD 15, 23-50-26w4	General Petroleums, Ltd.
Leduc-Continental 1	LSD 9, 33-49-26w4	G. C. Champ
Leduc-Continental 2	LSD 1, 9-50-26w4	Location
Leduc-Continental 3	LSD 2, 7-50-25w4	Location
Leduc-Continental 4	LSD 7, 7-50-25w4	Location
New Ranchmen-Comm. 1	LSD 11, 7-49-24w4	General Petroleums, Ltd.
Okalta-Leduc 1	LSD 13, 7-50-25w4	Company rig

*In Canada, under the dominion government surveys, townships are numbered from south to north, beginning with the international boundary and extending to the northern limits of the province. Ranges are numbered from a principal meridian west. The first meridian governs Manitoba; second and third, Saskatchewan; fourth and fifth, Alberta; and the sixth the northern foothills.

13	12	11	10
12	11	10	9
5	6	7	8
4	3	2	1

In land descriptions the meridian number follows the range number, as 1w5, meaning the first range west of the fifth meridian. The townships are divided into sections, as in the United States, the sections being numbered as shown in the diagram at the right. A section is further divided into 16 legal subdivisions (LSD), numbered as shown in the diagram at the left.

31	32	33	34	35	36
30	29	28	27	26	25
19	20	21	22	23	24
18	17	16	15	14	13
7	8	9	10	11	12
6	5	4	3	2	1

are useful primarily for refining into industrial or railroad fuel oils which are little needed in the area. Hence, the high-gravity crude of Leduc field (now running 40°-41° A.P.I.) is a welcome discovery from the standpoint of consumer products.

Many Companies Now Leasing

The Alberta Government holds the major portion of the oil and gas rights in the province. However, there are three other sources from which rights may be leased or reserved. These are: Canadian Pacific Railway, a large holder of mineral rights; a large number of individuals who have "freehold" rights; and a number of large holding companies such as Hudson Bay Oil & Gas Co., Western Leaseholds, Ltd., and Calgary & Edmonton Corp.

At the time the Leduc discovery was made, Imperial had the largest share of the mineral rights in the region with about 2,000,000 acres under lease or reserve. It had one gravity-meter and three seismograph parties in the field exploring this acreage. The second major initial leaseholder was McColl-Frontenac Oil Co., Canadian affiliate of The Texas Co., with about 1,100,000 acres of holdings. Two other "majors" had significant holdings at this stage—Gulf Research & Development Co., subsidiary of Gulf Oil Corp., and California-Standard Co. Independents with close-in acreage were Anglo-Canadian Oil Co., Ltd., in partnership with Calgary & Edmonton Corp.; Home Oil Co.; and Globe Oil Co.

Following the discovery a number of companies entered the scramble for acreage and the area is now dotted with the holdings of many majors and independents. Among the companies involved are: Socony-Vacuum Exploration Co.; Husky Refining Co. of Wyoming; Superior Oils, Ltd.; British Dominion Oil & Development Corp., Ltd.; Mid-Continent Oil & Gas, Ltd.; Arrow Oil Co., Ltd.; Royal Canadian Oils, Ltd.; Valley Oil Operators, Ltd.; United Oils, Ltd.; Coastal Oils, Ltd.; Vulcan Oils, Ltd.; Pacific Petroleums, Ltd.; Vanalta, Ltd.; R. C. Carlyle & Associates; Robert Arthur Brown, Jr.; Edward George Lawrence; Princess Petroleums, Ltd.; Harry Stinson Price; Argus Fraser Duncan; Peter William Noel Graham; and Donald Rae Fisher.

Several new corporations were formed for the purpose of obtaining and developing holdings in the Leduc region, including, Calmont-Leduc Oils, Ltd.; East Leduc Oils, Ltd.; Millet-Leduc Oils, Ltd.; Leduc Consolidated Oils, Ltd.; and Leduc-West Oil Co., Ltd.

The Leduc discovery is the result of a long and intensive exploration program in Western Canada. Imperial Oil alone, has invested $23,700,000 in exploration since 1917 and has drilled in 182 test wells of a total depth of 850,000 ft. The company holds explo-

ration rights on over 9,000,000 acres of land. It costs about $2,000 a month to keep a gravity crew in the field, and more than $15,000 a month for a seismograph party, according to Imperial. Actual drilling costs in Alberta range from $7 per foot in the plains to $50 in the foothills.

There are several factors involved in the selection by geologists of the Leduc site for a wildcat well. The first proof of commercial Devonian production in the plains came from a California Standard well which found oil in the Devonian at Princess, some 200 miles southeast of Leduc. Following this well, seismic surveys of the Devonian were undertaken in the areas considered most favorable for oil accumulation. The surveys discovered a seismic anomaly in the Devonian under Leduc and the famous test was started on November 20, 1946. On November 13, 1947, the well "blew in" for the largest initial flow of any well yet recorded on the Canadian plains.

Following the initial well, Imperial undertook an intensive development campaign in the area and as of early August had completed seven producers in the area and definitely established the fact that there was a field. Other operators also have programs under way and the 2 Globe Leduc West came in on August 2 for the first producing well for an operator other than Imperial. At present, there are 20 locations in the field, 7 of which are staked locations, and remainder are active drilling locations.

The majority of the wells are being drilled by drilling contractors. Imperial had four of its own rigs in the field during the early stages, but has now moved these rigs to wildcat locations and is using contract rigs for Leduc. The accompanying table shows the active locations and drilling contractors in the field as of the first week in August. Initial drilling was done primarily by diesel rigs, but several operators are now using steam rigs. Fuel for the steam rigs is being obtained by drilling gas wells to the Viking sand at around 3,500 ft.

Thus far, approximately 1,000 ft. of Devonian limestone have been penetrated at Leduc and three zones have been labeled as productive or potentially productive. Imperial and other companies in the area now call these three zones, D1, D2, and D3, as shown in the accompanying diagram.

Through July 18, Imperial's first four completions had produced 46,985 bb. of 40°-41°-gravity A.P.I. oil. Production is restricted from all wells to obtain maximum efficient recovery. Also, no pipe-line facilities are available and it is necessary to truck the oil to Nisku, on the Canadian Pacific Railway, a distance of 6 miles. This of necessity restricts the production.

Pipe Lines and Refineries

At the present time Imperial's oil is going by truck to the Canadian Pacific Railway for shipment to the Imperial refinery at Calgary. With completion of the pipe line to Nisku, as previously mentioned, the oil will go to the Calgary and/or Regina refinery. Leduc-Consolidated Oils, Ltd., which has three wells drilling in the field, plans to send its production to the Turner Valley field refinery of Gas & Oil Products, Ltd.

The Canol refinery, which Imperial purchased for $1,000,000 and is moving to Edmonton, is the company's eighth, and its second in Alberta. The existing Alberta refinery at Calgary has a 9,500-bbl. capacity. The largest Imperial refinery—and the largest in Canada—is the 46,000-bbl. plant at Sarnia, Ont.

Movement of the Canol plant and equipment is being made from White Horse along the 918 miles of the Alaskan Highway to Dawson Creek, B. C., and thence some 430 miles by rail to Edmonton. The refinery will be set up on a 365-acre site near Edmonton, and is expected to be in operation before the end of 1948. The cost of setting up the White Horse plant will be $6,000,000 to $7,000,000, approximately the cost of a new plant, but it is estimated the purchase will save 18 months of the time required to build an entirely new refinery. The plant will have an initial capacity between 4,000 and 6,000 bbl. daily.

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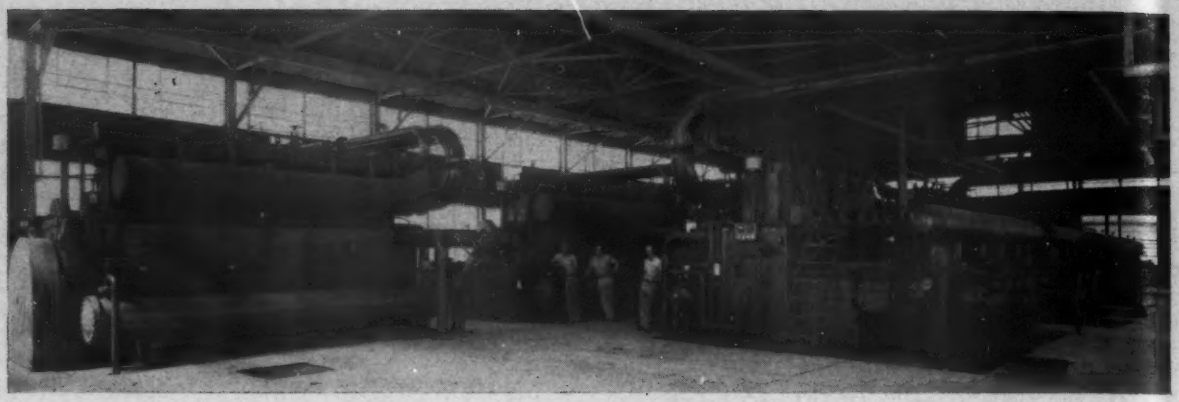


Compressor plant under construction in the Eunice, N. M., area having nine 1,200-hp. units which raise pressure to 500 psi.

Advanced Design Features Compressor Stations on El Paso Natural Line

by Paul Reed

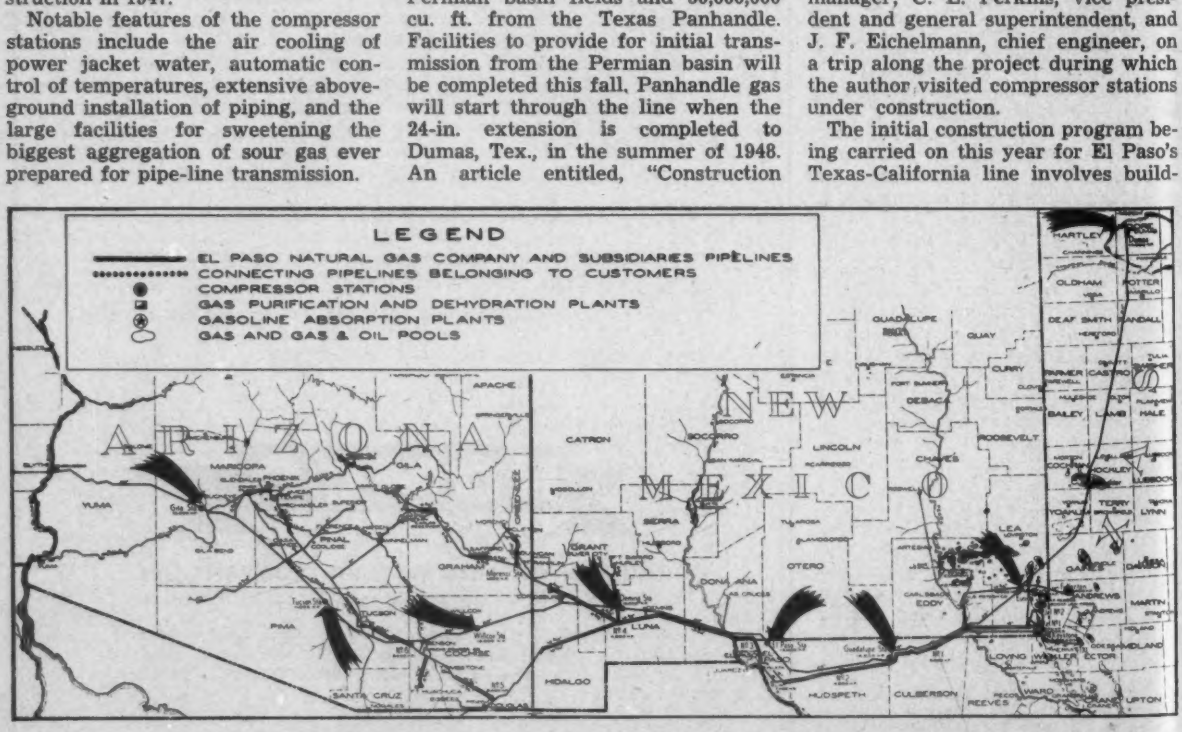
SOME distinct departures from customary practices are to be observed in the principal features of the compressor stations now being built by El Paso Natural Gas Co. to serve the company's Texas-California 740-mile 26-in. line which is the largest project of the industry under construction in 1947.

Notable features of the compressor stations include the air cooling of power jacket water, automatic control of temperatures, extensive above-ground installation of piping, and the large facilities for sweetening the biggest aggregation of sour gas ever prepared for pipe-line transmission.

The El Paso Natural undertaking, initiated by Paul Kayser, president, to augment declining California gas supplies, is now estimated to cost $43,000,000 to provide for the first phase of operation for a total daily throughput of 175,000,000 cu. ft., of which 125,000,000 cu. ft. is to come from Permian basin fields and 50,000,000 cu. ft. from the Texas Panhandle. Facilities to provide for initial transmission from the Permian basin will be completed this fall. Panhandle gas will start through the line when the 24-in. extension is completed to Dumas, Tex., in the summer of 1948. An article entitled, "Construction Methods Followed in Laying El Paso Natural's 740-Mile 26-In. Texas-California Line," by the author, appeared in The Oil and Gas Journal, page 60, July 12, 1947.

Information for this article was procured with the assistance of C. C. Cragin, vice president and general manager; C. L. Perkins, vice president and general superintendent, and J. F. Eichelmann, chief engineer, on a trip along the project during which the author visited compressor stations under construction.

The initial construction program being carried on this year for El Paso's Texas-California line involves build-


LEGEND
EL PASO NATURAL GAS COMPANY AND SUBSIDIARES PIPELINES
CONNECTING PIPELINES BELONGING TO CUSTOMERS
COMPRESSOR STATIONS
GAS PURIFICATION AND DEHYDRATION PLANTS
GASOLINE ABSORPTION PLANTS
GAS AND GAS & OIL POOLS
ARIZONA
NEW MEXICO
TEXAS
APACHE
CATRON
SOCORRO
LINCOLN
CHAVES
ROOSEVELT
LEA
EDDY
OTERO
DONA ANA
LUNA
GRANT
HIDALGO
HUDSPETH
CULBERSON
REEVES
WARD
PECOS
WINKLER
LOVING
ECTOR
MIDLAND
ANDREWS
MARTIN
HOWARD
GLASSCOCK
UPTON
REAGAN
CRANE
IRION
TOM GREEN
CONCHO
MCCULLOCH
SAN SABA
MILLS
COLEMAN
RUNNELS
CROCKETT
SUTTON
KIMBLE
MASON
LLANO
BURNET
WILLIAMSON
BELL
CORYELL
HAMILTON
LAMPASAS
MILAM
BURLESON
WASHINGTON
AUSTIN
FAYETTE
LAVACA
COLORADO
WHARTON
MATAGORDA
BRAZORIA
GALVESTON
HARRIS
MONTGOMERY
LIBERTY
CHAMBERS
JEFFERSON
ORANGE
HARTLEY
OLDHAM
POTTER
DEAF SMITH
RANDALL
CARSON
ARMSTRONG
DONLEY
COLLINGSWORTH
PARMER
CASTRO
SWISHER
BRISCOE
HALL
CHILDRESS
BAILEY
LAMB
HALE
FLOYD
MOTLEY
COCHRAN
HOCKLEY
LUBBOCK
CROSBY
DICKENS
KING
KNOX
HASKELL
THROCKMORTON
BAYLOR
YOUNG
ARCHER
WICHITA
CLAY
MONTAGUE
WISE
DENTON
COOKE
GRAYSON
FANNIN
LAMAR
RED RIVER
BOWIE
CASS
MARION
HARRISON
PANOLA
SHELBY
SAN AUGUSTINE
JASPER
NEWTON
TYLER
POLK
SAN JACINTO
HARDIN
JEFFERSON
CHAMBERS
LIBERTY
ORANGE
GALVESTON
BRAZORIA
MATAGORDA
WHARTON
COLORADO
FAYETTE
AUSTIN
WASHINGTON
BURLESON
MILAM
ROBERTSON
LEON
FREESTONE
ANDERSON
CHEROKEE
SMITH
GREGG
RUSK
UPSHUR
MORRIS
TITUS
CAMP
WOOD
VAN ZANDT
HUNT
KAUFMAN
ROCKWALL
COLLIN
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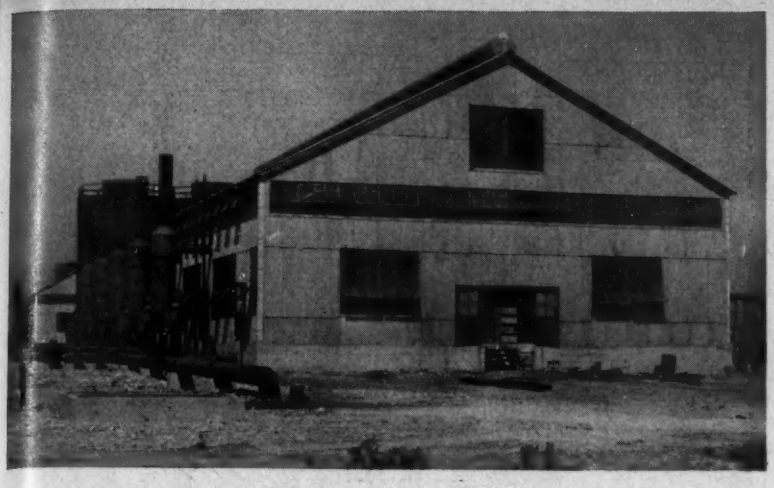


Above: The building in the foreground contains the nine 1,200-hp. units boosting the gas to 500 psi. before it passes through the treating and dehydrating plant. Building in the rear contains five 1,000-hp. units to boost to 800 psi. for transmission from the Eunice, N. M., area into the main 26-in. line
Right: Combination treating and dehydrating plant at Eunice, using amine glycol solutions

ing main-line stations with 5,000 hp. near Eunice, N. M.; 6,000 hp. near El Paso, Tex., and 7,000 hp. near Tucson, Ariz., and the building of field stations powered as follows: Fullerton, Tex., 8,400 hp.; TXL at Keystone, Tex., 2,400 hp.; Jal, N. M., No. 1, 2,400 hp. in addition to existing 1,200 hp., and near Eunice 10,800 hp. Compressor units totaling 5,000 hp. are being installed this year at Dumas, Tex., in advance of the 24-in. extension which will be completed in 1948.

In subsequent completion of the program to increase from 175,000,000 to 305,000,000 cu. ft. daily, additional units will be installed at the field stations. The three initial main-line stations, and new main-line station will be built near the Guadalupe Mountains in Texas; Deming, N. M., Willcox, and Gila Bend, Ariz., increasing facilities from the initial program utilizing units totaling 48,200 hp. to ultimate units totaling 138,200 hp.

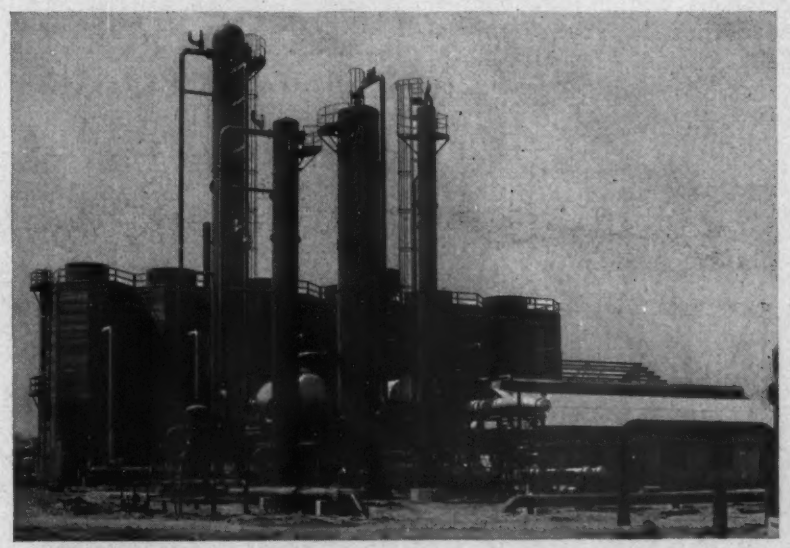
Although the 1947 program calls for installing 29,000 hp. at field stations, in comparison with the 18,000 hp. being installed this year at main-line stations, this article will be concerned largely with equipment at main-line stations which later will have units with the larger total of 84,000 hp. as compared with the total of 54,200 hp. for later field stations.

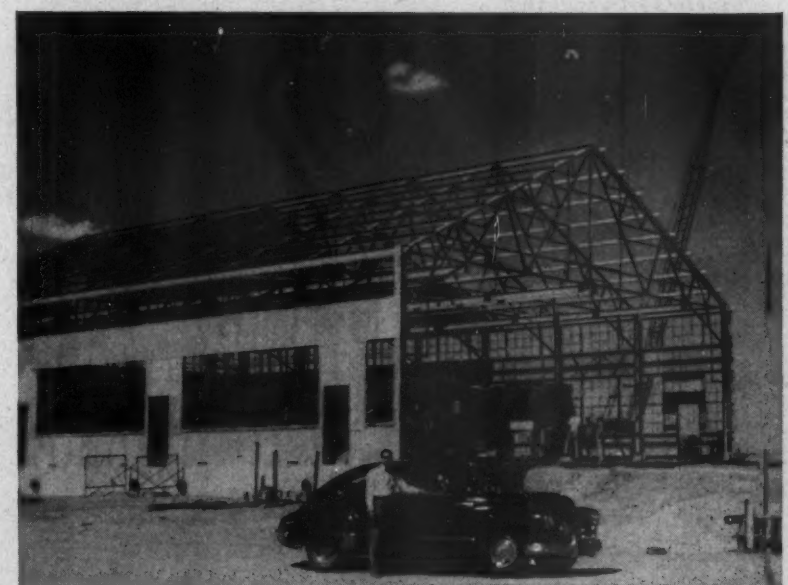
Before discussing main-line stations, certain features of field stations should be mentioned.

Field stations have gas-engine-driven auxiliaries except two stations with Worthington-Moore turbogenerators: at Eunice station there are two 1,500-kw. turbogenerators, both of the steam bleeder type, providing for extracting a portion of intermediate-stage steam for process operations. Jal No. 1 station has two 250-kw. turbogenerators of noncondensing type.

Since all gas for the California line is sour, large treating facilities are necessary to reduce hydrogen sulfide content from 100-600 grains per 100 cu. ft. to 0.25 grains per 100 cu. ft. before delivery into the main line. The El Paso Natural organization is installing equipment for sweetening and dehydrating gas at Eunice, Fullerton, Jal No. 1, and Keystone with a combined capacity of 261,000,000 cu. ft. When added to the 168,000,000 cu. ft. facilities installed prior to the California project, those together will give El Paso Natural a total of 429,000,000 cu. ft. treating capacity.

At the El Paso Natural stations in the Permian basin, combination treating and dehydration plants using amine-glycol solutions are being installed. In the Panhandle, glycol dehydration is to be used. The above





J. F. Eichelmann, chief engineer, El Paso Natural Gas Co., when he took the author to the El Paso compressor station, seen in the background, which has six 1,000-hp. units

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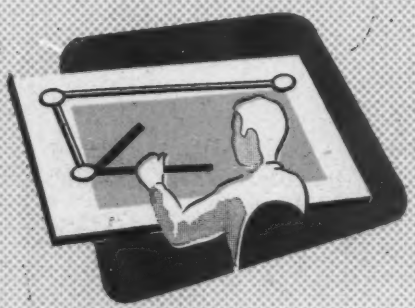

Engineering

"Cardwell's" Design Policy: Make all parts last for life of rig. Give greatest strength with lightest weight. Keep parts and assemblies simple. Standardize parts when practical. Consider accessibility of parts for easy replacement. Reduce gadgets to the minimum.

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Highly trained machine operators, accurate new machine tools and rigid inspection back "Cardwell's" guarantee of precision parts and assemblies.

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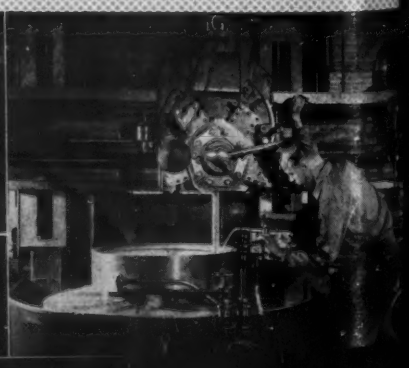


plants are being furnished by Fluor Corp. and Stearns-Roger Manufacturing Co.

Main-line compressor-station features may be conveniently discussed for the purpose of this short article in terms of the station now being built near El Paso with six 1,000-hp. Cooper-Bessemer units; the other main-line stations now being built are near Eunice with five Clark 1,000-hp. units and Tucson with seven Cooper - Bessemer 1,000 - hp. units. Operating conditions for the three stations are similar in many respects.

The El Paso station is at 4,000-ft. elevation while the Deming and Willcox stations will be at 4,500 ft. The El Paso station will operate with a suction pressure of 516 psi., and a discharge pressure of 841 psi. Compressor ratio will be 1.629. Fuel required daily will be 3,060,000 cu. ft. Elevation correction for horsepower at this location is 0.896 per cent.

The six 1,000-hp. Cooper-Bessemer units have 10 cylinders, at the power end, and 4 compressor cylinders.

Power-jacket water is cooled by circulation of air by Fin-Fan Fluor-Griscom-Russell equipment. Cooling tower water for cooling gas is circulated by turbine-type spray pumps. This is believed to be the first pipe line to use air cooling on such a large scale.

Since 1942 the El Paso company has been cooling engine-jacket water and gas with air at the existing system serving Tucson and Phoenix.

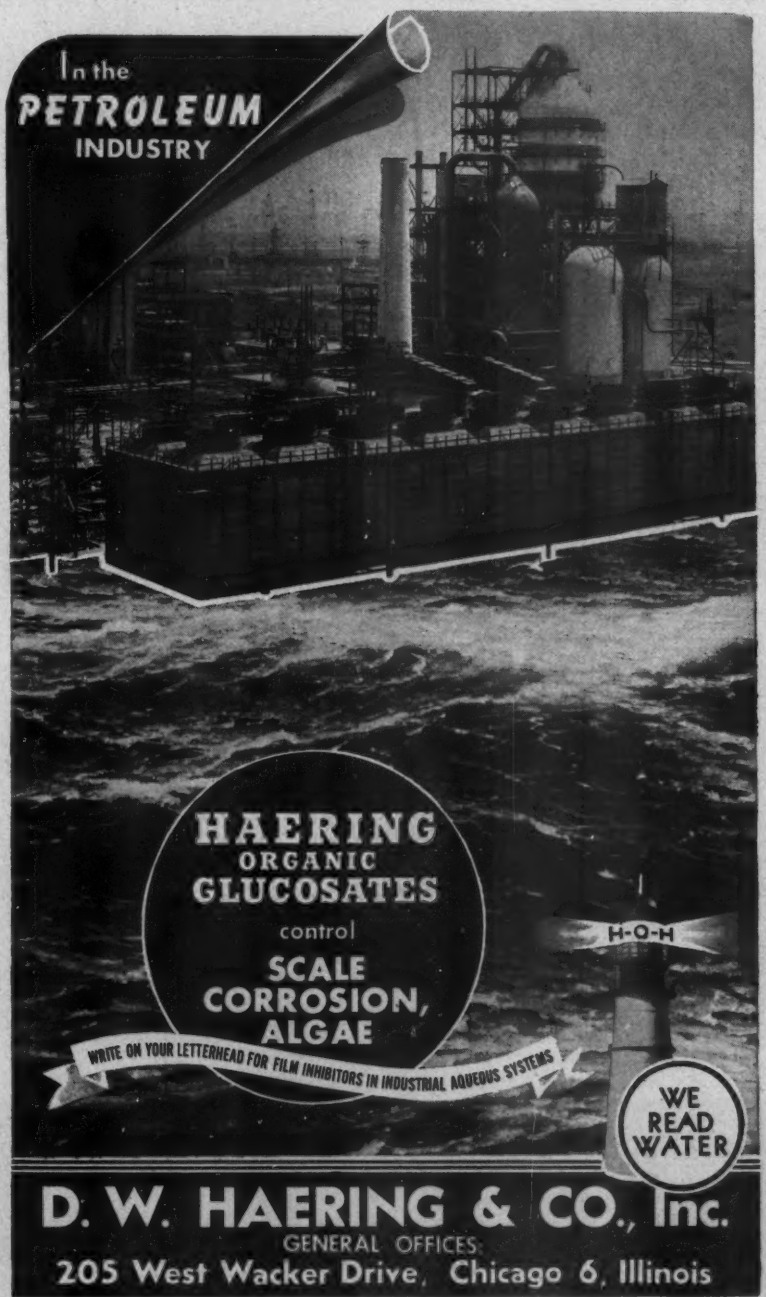
Automatic control to maintain constant water temperature is achieved by bypassing cooling equipment and by stopping or starting fans. Constant discharge gas pressure will be maintained automatically by varying engine speed. Furnished by Cooper-Bessemer for its units, there is a Hamml-Dahl lever-actuating mechanism on the governor. Clark units have Taylor actuating mechanism.

Compressor units at other stations are Cooper-Bessemer and Clark. All gas-engine-driven generator units are Ingersoll-Rand PVG-8, 250-kw. capacity.

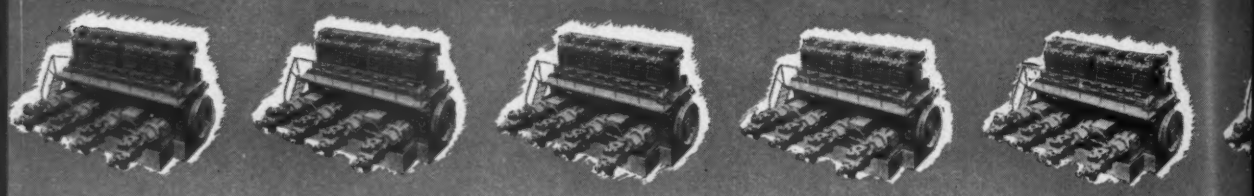
All piping for water circulation, auxiliary, and gas lines which connect various units in the stations is laid on racks aboveground to raise it above the corrosive conditions of the soil. In fact, the only lines placed underground are those for drain lines and starting air lines. There has been a gradual trend in the El Paso policies toward putting more and more piping aboveground. For the compressor stations on the California line, this piping practice has been applied more extensively than on previous projects.

Because of revolutionary departures from conventional practices, in numerous respects, the compressor stations of El Paso Natural Gas Co.'s trunk line to California will attract attention of the industry. From the start, the projects has been a pioneering effort, beginning with the original, bold conception of the first effort to transmit Mid-Continent gas across mountains and deserts to the California boundary. The design and execution of the plans have likewise been carried forward in a significantly progressive way.

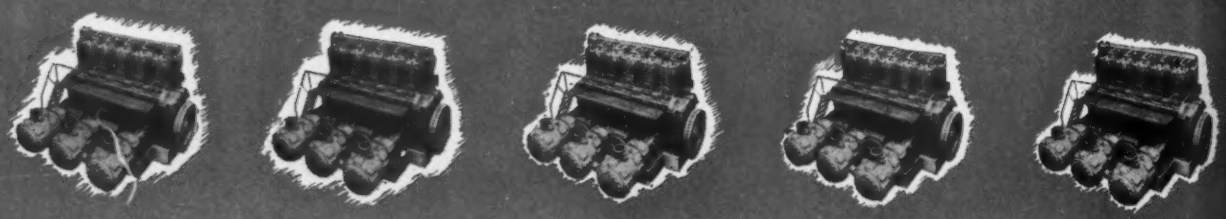
C. L. Perkins, vice president and general superintendent, El Paso Natural Gas Co., at construction operations



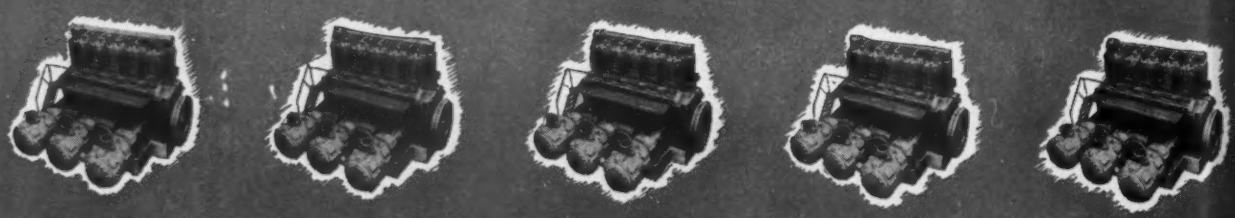
CLARK "BIG ANGLES"



AT EUNICE, NEW MEXICO—11 CLARK 6 CYL.



AT EUNICE, N. M.—5 CLARK 5 CYL. "BA's"—TOTAL 5,000 B. H. P.



AT DUMAS, TEX.—5 CLARK 5 CYL. "BA's"—TOTAL 5,000 B. H. P.

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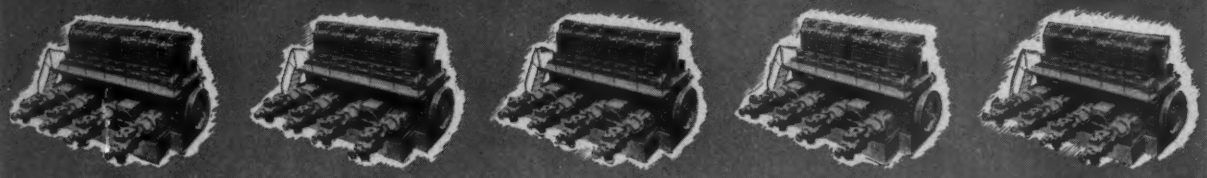

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A TOTAL OF 23,200 B. H. P.

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Twenty-one Clark "Big Angle" Compressors have been installed for gas booster service on the El Paso Natural Gas Co. Pipe Line. Still more units are to be added to the 23,200 B.H.P. of these efficient gas-engine-driven compressors now on the line.

Rating 200 B.H.P. per cylinder, the Clark "Big Angle" is the answer to the demand for *greater power in less space* and at *lower over-all cost.*

An outstanding feature of the "Big Angle" is the accessibility of all important parts for maintenance purposes. Standing on the platform, the operator can easily reach the air starting housings, cam shaft, cylinder head, bolting, spark plugs, gas injection and starting plugs. Compressor cylinder covers are large and easy to remove to get at the packing or other parts.

For pipe line booster service, repressuring or any other heavy-duty compressor service, the Clark "Big Angle" offers unique advantages. Sizes 5, 6, 8 and 10 cyl., 1000 to 2000 B. H. P.

For complete specifications and data on the "Big Angle", including typical installation design for modern pipe line station, write for Catalog BA17.

CLARK BROS. CO. INC., OLEAN, NEW YORK

CHEMICALS FROM PETROLEUM

and Natural Gas

by Gustav Egloff*

THE manufacture of chemicals from petroleum is at present a mammoth industry even though it had its beginning only about 20 years ago. From the hydrocarbons and minor amounts of oxygen, sulfur, and nitrogen compounds present in petroleum, hundreds of organic chemicals are now made commercially.

In 1925, petroleum derivatives constituted less than 0.1 per cent of all organic chemicals manufactured in the United States and the whole list of petroleum derived chemicals included only isopropyl alcohol and three chlorinated hydrocarbons. In 1946, 23 per cent of all organic chemicals were derived from petroleum or natural gas. The number of oil companies classified as chemical manufacturers has increased from one in 1935 to over 50 in 1946. Table 1 shows production figures for petroleum chemicals for 1925 and the years 1942 to 1946.

*Universal Oil Products Co., Chicago. A paper presented before 1947 Royal Institute of Chemistry Symposium, St. Andrews, Scotland, July 8, 1947.

The general public probably does not realize the roles which petroleum products play in their daily lives. It is familiar with gasoline and lubricating oils as service-station products and may realize that petroleum furnishes fuels for power plants and transportation units both land and marine. Not many realize the extent to which petroleum supplies other important products such as in the manufacture of plastics, textiles, detergents, insecticides, and fungicides. It furnishes ingredients for cosmetics, face creams, perfumes, flavorings, fumigants, and anesthetics as well as many familiar pharmaceutical products. It produces spray oils, weed killers, flameproofing and waterproofing compounds, refrigerating and antifreeze liquids, solvents, paints, synthetic rubbers, and inks to mention but a few. The American Petroleum Institute is the authority for the statement that 5,400 products have been developed from crude oil by petroleum industries. Our whole present-day civilization is geared to the use of petroleum products.

The hydrocarbons from petroleum available for chemical processing range from methane to high-molecular-weight compounds. Petroleums vary widely in composition. Some oils are predominantly paraffinic while others are naphthenic and aromatic in character. By using thermal

Industry Investing Upwards of a Third Billion Dollars in Gulf Coast Petrochemical Plants

Faith in the future of the petrochemical industry in the United States is signally shown by an investment of over $340,000,000 which is being made in installing plants in the Texas Gulf area alone. These projects, tabulated below represent only a fragment of the petrochemical plants which are being or to be installed in the United States.

Company and location—	Investment total
Carbide & Carbon Chemical Corp., Texas City — Doubling present plant capacity. Acetone, acetic acid, acetic anhydride, acetylene ethers, ethanol, ethylene and diethylene glycols, ethylene dichloride, methyl alcohols.	$31,000,000
Carthage Hydrocol, Inc., Brownsville, Tex. — Synthetic hydrocarbon plant, complete. Synthetic gasoline and heavier hydrocarbons; alcohols and oxygenated hydrocarbons.	20,000,000
Celanese Corp., Bishop, Tex. — Duplicating original unit. Acetic acid, acetone, methanol, formaldehyde, acetaldehyde, propionaldehyde industrial chemicals. New research $12,000,000. Laboratory, $3,000,000.	12,000,000
Dow Chemical Co., Freeport, Tex. — Carbon tetrachloride, perchlorethylene, ethylene and diethylene glycol, propylene glycol, etc.	150,000,000
Dow Chemical Co., Freeport, Tex. — Styrene unit. Styrene, polystyrene.	.....
E. I. Du Pont de Nemours Co., Orange, Tex. — *Not announced (estimated). Nylon salt and chemical units (estimated $50,000,000)—polythene, CH_3OH, adipic acid. 2,000 men for construction; 700 men for operation. Final total expenditure estimated $100,000,000.	*30,000,000
E. I. Du Pont de Nemours Co., LaPorte, Tex. — Phenothiazine, agricultural chemicals.	(?)
Jefferson Chemical Co., Port Neches, Tex. — Organic chemicals—ethylene glycol and oxide, textile and plastics, intermediate units.	12,000,000
McCarthy Chemical Co., Winnie, Tex. — Organic chemicals (just starting design and construction.)	3,000,000
Monsanto Chemical Co., Texas City — Styrene polymerization facilities. Styrene. Approximate cost $3,000,000.	25,000,000
Rohm & Haas, Houston, Tex. — All units. Plastics, ion exchange resins, etc.	5,000,000
Shell Chemical Co., Houston, Tex. — Twelve units partly built; glycerin $10,000,000, methylethylketone, ethyl alcohol $3,500,000, acetone, allyl alcohol and allyl chloride, etc., units.	26,000,000
Standard Alcohol Co., Standard Oil Co. (N. J.), Baton Rouge — Ethyl and i-propyl alcohols, oxygenated chemicals; ethers, hydrocarbons.	20,000,000

TABLE 1

Year	Petrochemicals* (lb.)
1925	< 150,000
1942	500,000,000
1943	1,564,915,000
1944	2,804,625,000
1945	3,300,000,000
1946	3,800,000,000

*The figures do not include benzene, toluene, xylenes, and other aromatics which in 1945 amounted to 1,846,036,000 lb.

TABLE 2—COMPOSITION OF NATURAL AND CRACKED GASES (HYDROCARBON BASIS)

Constituent—	Natural gas	Thermal cracking gas	Catalytic cracking gas
Hydrogen	0.0	4.7	29.6
Methane	85.0	32.7	18.0
Ethane	8.0	21.6	8.0
Ethylene	0.0	2.0	4.0
Propane	4.0	17.2	15.0
Propylene	0.0	7.4	8.0
n-Butane	1.5	4.4	3.0
i-Butane		2.0	7.5
n-Butylenes	0.0	3.7	5.2
i-Butylene		1.8	1.7
C_5 plus	1.5	2.5	0.0

and catalytic cracking processes, hydrogenation, dehydrogenation, polymerization, isomerization, and alkylation, hydrocarbons of practically any structure can be produced.

Composition of natural gases is extremely variable (see Table 2). They may contain low percentages of hydrocarbons and relatively large amounts of carbon dioxide or nitrogen. The composition of the thermally cracked gas as shown is typical of gas mixtures obtained in cracking gas oils. The gas from catalytic cracking is representative of those obtained from gas oil using the fluid flow catalytic cracking process.

Liquid petroleum fractions are an even greater source of base materials for chemical manufacture than the gases. In gasoline from primary petroleum distillation, all of the normal paraffins up through n-octane and many of their isomers are found. Naphthenes present include cyclopentane and its mono and dimethyl derivatives, cyclohexane, methylcyclohexane, and polymethyl cyclohexanes. The proportions of paraffins and naphthenes vary greatly. In a few petroleums the gasoline fraction contains the aromatics, benzene, toluene, and xylenes in recoverable quantities, as in the case of Borneo crude oil. Corresponding cracked gasoline fractions may contain from 10 to 75 per cent olefins and up to 50 per cent aromatics. Gasolines from catalytic cracking processes may contain 50 per cent of isoparaffins and only 5 per cent of olefins. Cracked gasolines contain amylenes, hexylenes, heptylenes, and octylenes as well as benzene, toluene, and xylenes. United States production of gasoline is about 780,000,000 bbl. annually. Less than 5 per cent of this would be required to manufacture all organic chemicals needed at present in the United States.

Alkylation

In addition to cracking, other hydrocarbon conversion reactions produce compounds suitable for manufacture of still more chemical derivatives. By the cracking of heavy molecules and the synthesis of new hydrocarbons from the fragments, compounds are produced which were not originally present in the crude oil.

One of the most important of these processes is alkylation, some examples of which follow. Isobutane is alkylated with ethylene at high temperatures and pressures without catalysts to produce 2,2-dimethylbutane (neohexane) and at lower temperatures and pressures using aluminum chloride catalyst to obtain 2,3-dimethylbutane (diisopropyl). The alkylation of isobutane with propylene produces isoheptanes including traces of triptane. The catalytic alkylation of isobutane with butylenes yields trimethylpentanes including the 2,2,3-, 2,2,4- and the 2,3,4- compounds. Alkylation processes use sulfuric acid, hydrogen fluoride and aluminum chloride catalysts. During the war as much as 150,000 bbl. of alkylates were produced daily.

Alkylation of benzene with each of the gaseous olefins is commercial practice. The use of ethylene gives ethylbenzene. Propylene yields isopropylbenzene, used in aviation gasoline during the war. Normal and isobutyl benzenes are also obtained when alkylating with four carbon atom olefins. Isobutyl benzene is the Victane used in British aviation fuels. Alkylation of naphthalene with high molecular weight olefins produced in cracking paraffin waxes gives a lubricating-oil pour-point depressant and improver.

Catalytic Dehydrogenation

The catalytic dehydrogenation process makes possible the production of many highly important chemicals. Dehydrogenation of propane and butanes increases the available supply of the corresponding olefins. This reaction is also applied to normal butane and normal butylenes to produce butadiene so highly important in the manufacture of synthetic rubbers and plastics. Styrene, another strategic chemical in synthetic rubber and plastics production, is the product of the dehydrogenation of ethylbenzene.

Petroleum fractions containing cyclohexane and methylcyclohexane are catalytically dehydrogenated to produce benzene and toluene, which are recovered in a high degree of purity by azeotropic distillation. During World War II, toluene was produced at a rate of 270,000,000 gal. a year by catalytically dehydrogenating petroleum fractions rich in methylcyclohexane. Processes are also available for making benzene and toluene by the catalyzed dehydrocyclization of normal hexane and heptane respectively.

The hydrogenation process is also of assistance in altering hydrocarbon structures. Direct hydrogenation of olefins produces the corresponding paraffins and hydrogenation of aromatics produces partly hydrogenated compounds or completely hydrogenated cycloalkanes. An example of the former is the production of isooctane by hydrogenating diisobutylene. The latter is typified by production of cyclohexane from benzene. Destructive hydrogenation can also be employed to increase the yield of low-boiling hydrocarbons from crude oil and alter the composition of the heavier portions.

Polymerization of Olefins

Polymerization of olefins in cracked gas is operated to produce products varying from dimers to solid multipolymers. Particularly important are the individual polymerizations of ethylene, propylene, and isobutylene. The polymerization of ethylene produces several types of products, including lubricating oils and the plastic material known as Polythene which is used extensively as insulation for high frequency electrical cables. The polymerization of propylene can be controlled to produce di, tri, tetra or hexapolymers which are used in motor fuel or in derivative manufacture. The tetramer is used to alkylate benzene which is then sulfonated to produce a detergent. With catalysts such as sulfuric acid or solid phosphoric acid, isobutylene is polymerized to mixtures of dimers which are hydrogenated principally to 2,2,4-trimethylpentane, the hydrocarbon used as a standard for 100-octane rating. More extensive polymerization of isobutylene yields a whole battery of polymers ranging from various viscous liquids to solids. The copolymerization of isobutylene with a small amount of isoprene at —38° C. gives butyl rubber, the superior new product for inner-tube manufacture.

G.R.-S. rubber is an excellent example of the integration of three preceding processes. Ethylbenzene, produced by alkylation, is dehydrogenated to styrene which in turn is copolymerized with butadiene obtained from a dehydrogenation process. The resultant product is G.R.-S. rubber of which about 1,600,000,000 lb. were made in 1945 from 400,000,000 lb. of styrene and 1,200,000,000 lb. of butadiene.

Oxygen Compounds

In addition to hydrocarbons, oxygen, halogen, sulfur, and nitrogen

Stanolind Contracts For Sale of Chemicals Production

STANOLIND OIL & GAS CO. has announced that a contract has been made with U. S. Industrial Chemicals, Inc., for sale of the entire production of water-soluble oxygenated chemicals from the chemical-separation plants which Stanolind will construct to recover and refine the synthetic chemicals produced by two Synthol (Fischer-Tropsch) plants, one of which will be built by Stanolind and the other by Carthage Hydrocol, Inc.

These chemicals, which are produced as coproducts in the synthesis of gasoline from natural gas, comprise a diversified number of solvents such as ethyl and butyl alcohols, acids, and ketones, and several new products of great interest to the chemical industry. All of them will either be used by U. S. Industrial Chemicals for further processing or sold by that company as such in conjunction with their present products.

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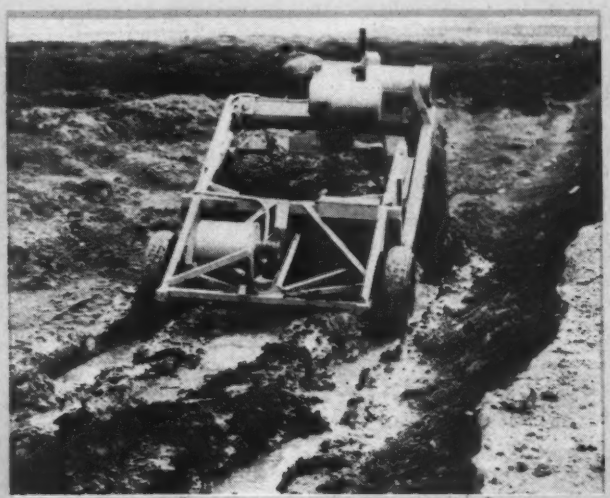

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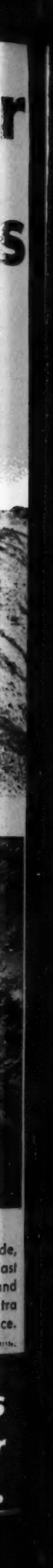

compounds add to the number of compounds produced from petroleum. Oxygen compounds directly recoverable from petroleum include phenols, cresols, xylols, and naphthenic acids. Phenols are being extracted commercially from petroleum naphthas and gas oils. The production of cresols from petroleum amounted to more than 10,000,000 lb. in 1945 which was about 35 per cent of total United States production. The direct recovery of these compounds from petroleum is limited since not all oils contain cresols.

Naphthenic acids are recovered by the alkaline extraction of petroleum. In 1945, 30,000,000 lb. were obtained. They are used in fungicides, high-pressure lubricants, and as rust preventives. Copper and zinc naphthenates are of particular importance. They are useful as paint driers, and during the war they made it possible for the Army to avoid untold misery in the tropical climates. By impregnation of clothing and tents with these materials, deterioration of such items by mildew and molds was prevented, our soldiers better clothed and more comfortably housed.

The oxidation of petroleum gases, liquids, and wax produces alcohols, aldehydes, ketones, and acids. Several commercial plants in the United States oxidize natural gas to produce methanol, ethanol, propanol, formaldehyde, acetaldehyde, propionaldehyde, acetone, formic, acetic, and propionic acids. From the primary products of oxidation numerous other derivatives are made. For example, the dehydration of ethyl alcohol produces diethyl ether and the dehydration of isopropyl alcohol yields diisoproyl ether having high-octane rating in motor-fuel blends.

The Fischer-Tropsch process is being adapted to the production of hydrocarbons and oxygenated compounds from natural gas. Two commercial plants are projected, one of which will use 64,000,000 and the other 100,000,000 cu. ft. of gas a day. In this process the natural gas is oxidized at temperatures from 1,480° to 1,540° C. at a pressure of 300 psig., to produce mixtures of carbon monoxide and hydrogen which are then contacted with iron catalyst to produce gasoline, diesel oil, and mixtures of oxidized compounds from which alcohols, aldehydes, acies and ketones are recovered. The larger* of the two plants is expected to produce about 6,000 bbl. of 80-octane gasoline, 1,000 bbl. of diesel fuel, and over 400,000 lb. of organic chemicals daily. The anticipated annual production (over 152,000,000 lb.) of these chemicals from this plant is shown in Table 3.

While the plants were designed primarily to produce motor fuel, the production of chemicals will be an important part of the operation.

*Stanolind Oil & Gas Co., plant in Hugoton, Kans., gas area.

TABLE 3

Chemical—	Lb.
Methyl alcohol	730,000
Ethyl alcohol	63,680,000
n-Propyl alcohol	14,400,000
n-Butyl alcohol	4,370,000
n-Amyl alcohol	1,060,000
Acetaldehyde	9,100,000
Propionaldehyde	1,930,000
n-Butyraldehyde	2,750,000
Acetic acid	24,700,000
Propionic acid	8,700,000
n-Butyric acid	4,200,000
Acetone	11,200,000
Methyl ethyl ketone	4,780,000
Methyl propyl ketone	600,000
Methyl n-butyl ketone	250,000

Oxidation of orthoxylene from petroleum to produce phthalic anhydride is a new development which has recently been put into commercial practice. The first plant which is in California is now producing 8,000,000 lb. a year. Continuing demands for phthalic anhydride will undoubtedly lead to the construction of more of these plants as there is a shortage of naphthalene which has formerly been the basic material for this chemical. The annual capacity of the plants utilizing naphthalene is 133,000,000 lb., which does not meet the requirements of the resin and plastic industries.

Paraffin waxes are oxidized to produce high-molecular-weight fatty acids which can be reacted with glycerine to produce synthetic edible fats.

Halogen Compounds

Halogenation of paraffins, olefins, naphthenes and aromatics from petroleum produces a large number of primary products having utility as such or in further conversion to other compounds. Among the more important commercial products from the halogenation of paraffins are carbon tetrachloride, difluorodichloromethane which is used as a refrigerant and ethyl chloride used in the manufacture of tetraethyl lead.

The halogenation of ethylene yields other important intermediates and chemical products. Vinyl chloride, the basic material for many plastics and resins, is made by direct chlorination of ethylene to ethylene dichloride and subsequent removal of hydrogen chloride. Thiokol rubber is produced from ethylene dichloride and sodium-polysulfide. Ethylene dibromide which is used with tetraethyl lead in improving the antiknock value of gasoline is the product of direct addition of bromine to ethylene.

Ethylene chlorohydrin is an intermediate for a variety of chemical products. Glycol, an antifreeze for automobile radiators, is one of them. An interesting recent development is polyethylene glycol or so-called Carbowax. This substance has oily and wax-like properties but is water soluble. It has many industrial uses where ordinary hydrocarbon lubricants are undesirable. For example, it can be used for lubricating rubber

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molds, because it is not soluble in rubber. Similarly it is specially adaptable to lubricating textile machinery, since it can be removed from fabrics by water alone.

Halogenation of propylene has presented interesting possibilities. Chlorination at low temperatures gives propylene dichloride, while at high temperatures of the order of 500° C., allyl chloride is produced which upon alkaline hydrolysis yields allyl alcohol. These allyl compounds form bases for the manufacture of perfumes, flavorings, plasticizers, soporifics, and miscellaneous pharmaceuticals.

Glycerine, which has been in low supply because of the fat shortage since the beginning of the war, can also be produced from propylene. The commercial manufacture is expected to start in 1948 in a $7,000,000 plant which will have an annual capacity of 30,000,000 to 35,000,000 lb. The reactions which make this much-needed development possible are the preparation of allyl alcohol from propylene with subsequent addition of hypochlorous acid to the alcohol followed by hydrolysis to glycerine.

The new soil fumigant, D-D, is composed principally of dichloropropane and dichloropropylene which are produced by the controlled chlorination of propane-propylene mixtures from cracked gases. This product is proving to be remarkably efficient in restoring blighted agricultural areas to fertility by ridding the soil of nematodes and wireworms.

Many of the new insecticides are petroleum-derived halogen compounds. The most widely known of these is DDT [1,1,1-trichloro-2,2-bis(p-chlorophenyl)-ethane]. The steps in its production involve the chlorination of ethyl alcohol to produce chloraldehyde, the chlorination of benzene to chlorobenzene, and condensation of these products using fuming sulfuric acid as a condensing agent. The product obtained is a white powder soluble to the extent of about 5 per cent in kerosine and other organic solvents. With the exception of chlorine, all of the necessary chemicals and reagents for the production of DDT can be obtained from petroleum. The alcohol may be made from ethylene found in cracked refinery gases. The benzene can be separated from cracked products or produced by the dehydrogenation of cyclohexane, and the sulfuric acid made from sulfur contained in petroleum or natural gas.

There are many other halogen-containing insecticides which have been made from petroleum hydrocarbons. One which in some cases equals or exceeds DDT in effectiveness is the gamma isomer of hexachlorocyclohexane commonly designated as "Cammexane." It is made either by chlorinating benzene or cyclohexane obtained from petroleum. The chlorination of benzene must be conducted under the influence of light. Over 600,000 lb. of this compound was produced in the first quarter of 1947. It dissolves in kerosine, can be used in solution, in water emulsion, or as powder. Its vapors have fumigating properties. Paradichlorobenzene is effective against fungus and mildew diseases of plants and also against moths. Special insecticides having the same structure as DDT have been made in which the different chlorine atoms have been replaced by fluorine. The effectiveness of these mixed halogen compounds varies with the extent and position of fluorine substitution.

In the manufacture of new silicones, the first step involves the use of alkyl chlorides. The latter are reacted with silicon tetrachloride using Grignard catalysts to produce alkyl silicon chlorides. By hydrolysis, alkyl silicon oxides and hydroxides are formed and polymerization yields a variety of products among which are lubricants having substantially the same viscosity at from 0° to 205° C. electric insulation and the now famous "bouncing putty."

Chlorinated derivatives of paraffin wax are finding increasing use in flame proofing, in extreme pressure lubricants, in cutting and drawing oils, and in treating textiles to render them flame resistant, water and mildewproof.

Sulfur Compounds

Sulfur in petroleum and natural gas represents a large tonnage. Pure sulfur is being recovered from an Arkansas natural gas which contains from 6 to 8 per cent of hydrogen sulfide. The gas is partially oxidized to produce a mixture of sulfur dioxide and hydrogen sulfide which are reacted to produce sulfur. One plant has produced 75,000 tons of sulfur having a market value of $1,250,000. In some refineries in the United States hydrogen sulfide is oxidized to sulfur dioxide for conversion to sulfur trioxide and sulfuric acid.

The gases and liquids from cracking high-sulfur petroleum fractions contain mercaptans which require removal on account of their offensive odor and toxic properties. These mercaptans are removed by selective solvents and used either for chemical manufacture or for odorizing domestic fuel gases.

It has been found practical to make thiophene by reacting butane with sulfur. This product may be useful in the pharmaceutical industry. Thiophene dyestuffs are being developed and the reaction of thiophene with formaldehyde has produced some thermosetting resins. Carbon bisulfide has been made on a pilot plant scale by interacting methane with sulfur.

Sulfonation reactions are applied to petroleum hydrocarbons to produce a large number of products. One of the more important is alcohol produced by hydrolysis of diethyl sulfate from

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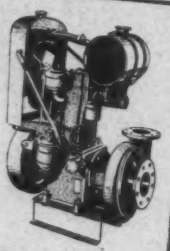
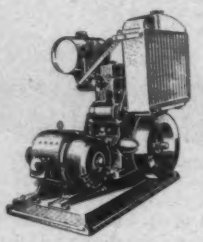
Sheppard's the Diesel

8 to 18 h.p.
HALLETT DIESEL ENGINES
FOR OIL FIELD OPERATIONS

FOR PUMPING

Diesel dependability makes Hallett the ideal pumping unit. Available in a wide range of capacities.





FOR ELECTRIC POWER

Diesel economy means the convenience of electricity for every oil field operation.

2 to 10 kw.

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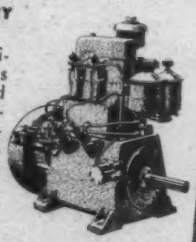
Diesel efficiency means economy and efficient power. Large Timken bearings withstand the load from any type power takeoff.



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ethylene and sulfuric acid. This method of making alcohol has been in commercial operation for many years and the cost of alcohol from this process is considerably less than that from fermentation of grains and molasses. In 1945, the ethyl alcohol production from petroleum was over 111,000,000 gal. The volume is now 70,000,000 gal. a year but predictions are that in the next few years 200,000,000 gal. will be required annually for organic chemical manufacturing. Isopropyl alcohol by a similar process is made from isopropyl sulfate. This was one of the first chemical derivatives from petroleum and was in commercial production prior to 1925. In 1945, 75,000,000 gal. of isopropyl alcohol were produced in the United States. The catalytic dehydrogenation of isopropyl alcohol produces acetone and the process is being applied commercially to augment supplies of this widely used and much needed compound. Secondary butyl alcohol is made by absorbing isobutylene in sulfuric acid followed by hydrolysis of the product. The dehydrogenation of this alcohol produces methyl-ethyl ketone, an important solvent particularly in the dewaxing process.

At the present time, 50 per cent of ethyl alcohol is produced from ethylene. All of the isopropyl alcohol comes from propylene. 75 per cent of acetone production is from petroleum sources. Normal butyl alcohols from petroleum constitute 35 per cent of the national production and amyl alcohol constitutes 90 per cent.

Most of the synthetic detergents which increase our soap supply are made from petroleum-derived hydrocarbons. The bulk of these detergents is made by alkylating benzene with olefins containing from 10 to 16 carbon atoms and sulfonating the product. Detergents are also made by sulfonating high-molecular-weight paraffins and reacting sulfuric acid with high-molecular-weight olefins or alcohols to produce alkyl sulfonates.

Manufacture of synthetic detergents is one of the fastest growing commercial developments. In 1941, 30,000,000 lb. were produced and in 1946, 125,000,000. Production in 1947 is expected to be double that of 1946. A billion pounds of detergents representing 25 per cent of the annual soap production is looked upon as a possibility within the next few years.

Nitrogen Compounds

Ammonia is synthesized from hydrogen obtained from the high-temperature cracking of natural or refinery gas and nitrogen from liquid air fractionation. Some of this ammonia is being injected into irrigation water so that irrigation and growth stimulation are combined in one operation. Some is oxidized by conventional methods to produce nitric acid which is then reacted with ammonia to form ammonium nitrate used in explosives and fertilizers.

PENBERTHY
EJECTORS

Use the power of steam, air or water under pressure to lift liquids. Being simple jet pumps they have no moving parts and require no lubrication. A variety of models to meet different conditions. Also used as water heaters.

PENBERTHY INJECTOR CO.
DETROIT, MICH. Canadian Plant WINDSOR, ONTARIO

FOR SALE

LOCKHEED LODESTAR

Factory installed, full airline interior. 14 passenger seats (reclining) with down-filled headrests. Individual lighting, heating and ventilation. Buffet, toilet and lavatory. Time on frame 1425 hours, powered by two 1820 Wright Cyclones, very low engine time. New Dual Automatic Direction Finders. Complete deicer equipment. Former use: domestic service by Navy executive. Easily arranged executive interior. Guaranteed. Best buy available, will consider trade.

JORDAN-AERO CO.
EAST BOSTON, MASS.
TELEPHONE: EAST BOSTON 1769

In recent years processes have been commercialized for the direct vapor-phase nitration of paraffin hydrocarbons. The production of commercial quantities of nitroparaffins and their products the alkylamines has made possible the development of entirely new fields of organic chemical manufacture and has fostered the growth of large-scale chemical industries. The high-pressure hydrogenation of nitroxylens has produced xylidines which add to the antiknock rating of motor fuel to which they are added as minor constituents.

Olefins and ammonia are now reacted directly to produce aliphatic nitriles. Ethylene amines are finding extensive use in the chemical industry. From cyanohydrin, acrylic acid for resins, and acrylonitrile for synthetic rubber are made. Ethylene oxide is produced by direct oxidation using silver oxide catalyst or by distillation of ethylene chlorohydrin with alkali. Treatment of ethylene oxide with ammonia gives a series of ethanolamines. Triethanolamine is used in removing acid constituents such as hydrogen sulfide and carbon dioxide from gas mixtures. It is also used in shaving creams and cosmetics, and is a powerful emulsifying agent.

The petroleum industry has made it possible for the manufacture of nylon to begin with cyclohexane. This compound is oxidized to adipic acid which is then reacted with ammonia to produce the ammonium salt. The salt is dehydrated to produce the nitrile and this compound is hydrogenated to hexamethylene diamine. Nylon is then produced by a condensation reaction between adipic acid and the diamine. The oil industry is also contributing to the improvement of nylon. One company is making special types of oils for penetrating nylon threads and to make them more plastic, flexible and stronger.

BOOKS

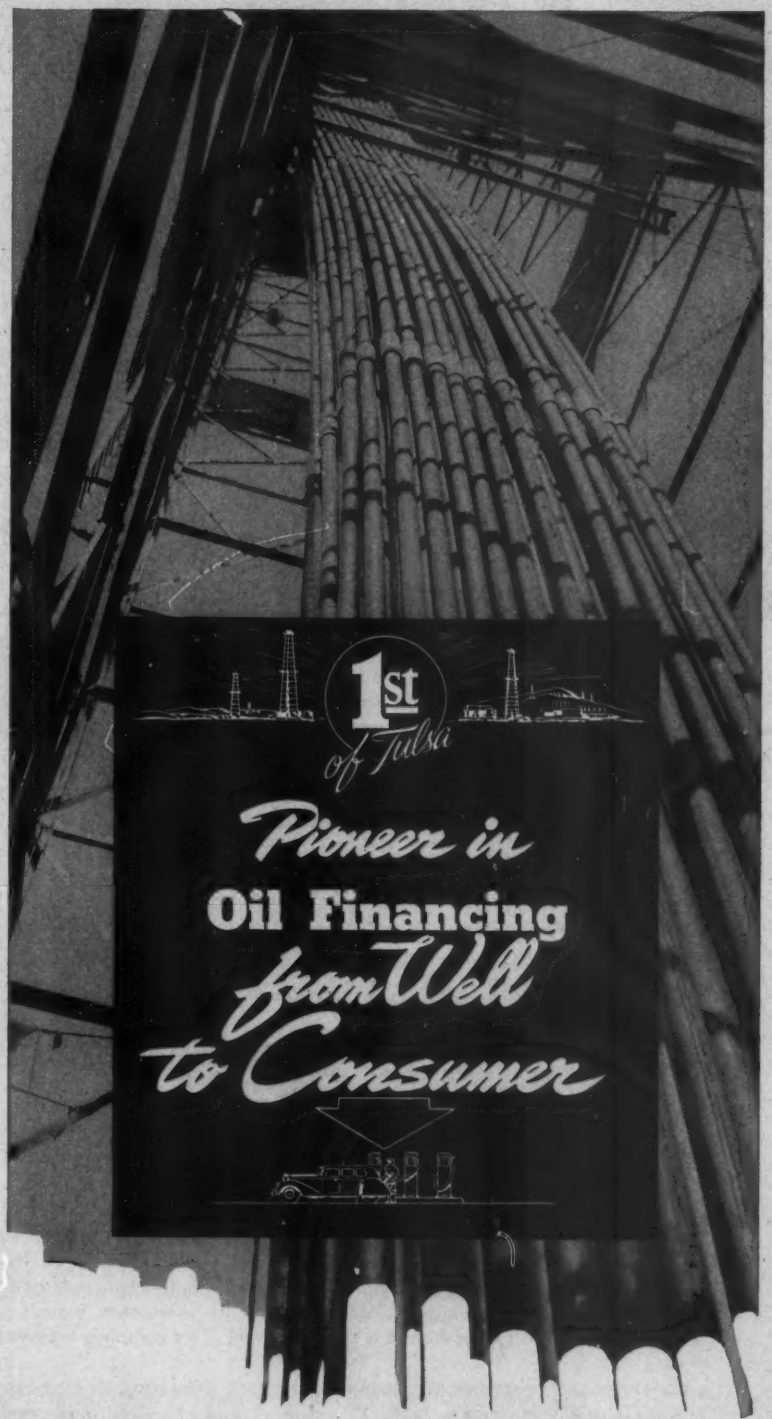
LAND MEASURES. By J. Roy Reasonover, Box 1746, Dallas. 124 pp. $5.

This book is designed as a reference work for lawyers, abstractors, land surveyors, civil engineers, engineering students, oil companies, realtors, architects, and others who have occasion to refer to various facts pertaining to land measures and quantities. Included are French, Spanish, and English land measures of the United States and Canada, with units, English equivalents, reduction and conversion factors.

ENCYCLOPEDIA OF HYDROCARBON COMPOUNDS. Vol. 2 -C_6 and C_7. Compiled by Joseph E. Faraday, Ph.D. Chemical Publishing Co., Inc., 26 Court Street, Brooklyn. 603 pp. $17.50.

This volume deals with compounds containing 6 and 7 atoms of carbon. New features include a comprehensive treatment of physical properties with references, the marking of methods which may be of special use for laboratory preparation, and an improved list of journals. The bibliographical references are especially complete. Another feature of the volume is the inclusion of data on free radicals; also on hydrocarbons containing heavy hydrogen and the carbon isotope 13.

Look Ahead With First National



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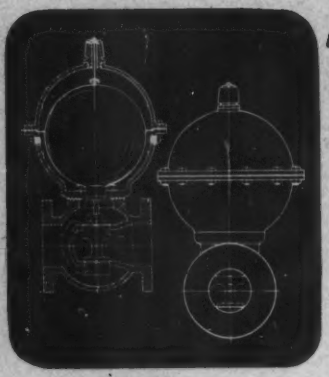

For STOCK TANK GATHERING LINES

THE Davis AIR-LOK VALVE

QUICK FACTS . . .

1. AUTOMATIC. Closes line as soon as withdrawal of liquid is completed.
2. PREVENTS TROUBLE. Keeps air or vapor from being drawn into pipe line.
3. SAVES LABOR. Tank gager can cover more area without being concerned about closing off manually operated valves.
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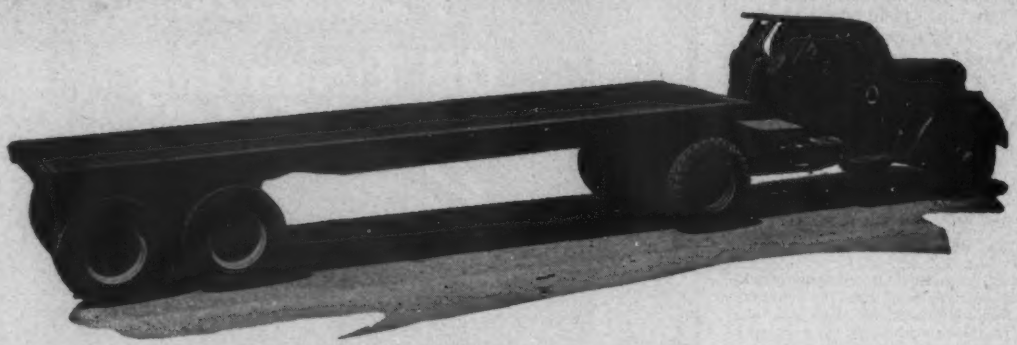

This serviceable American-built tandem platform trailer was developed by our engineering staff with the cooperation of hauling contractors and producers throughout the industry. It's sturdily-built to meet the most rugged hauling tests . . . designed and constructed from the standpoints of endurance, versatility and economical operation. The model S-F 42-T shown above is only one of a complete line of oil field platform and pole trailers—both single axle and tandem models in lengths to suit your needs. Prompt delivery assured. Write us TODAY for complete information—no obligation, of course.

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OIL AND GAS EQUIPMENT Digest

IT'S NEW CHECK IT

by John M. Spears

(1) NEW PRESSURE GAGE, in sizes from 1,000 to 10,000 lb., features gear and rack arrangement. Gears are large and will wear years without replacement. Pinion gear is turned from a solid shaft, consequently there is no lost motion between pinion and shaft. Gages are obtainable in two designs, one in which the hand revolves and the other in which the dial revolves. Gage may be attached to recorder with a chart of thin aluminum on which the record is made with a steel stylus. An alarm may also be furnished with a light or bell to be set to alarm when pump falls off. *Line Scale Co.*

IT'S NEW CHECK IT

(2) MOTO-SCRAPER is high-speed tractor-scraper combination consisting of a two-wheeled rubber-tired tractor joined to a 17.5-yard scraper by a pedestal hitch assembly to form a single integral self-propelled unit. It digs,

loads, transports, and spreads earth and other material on either long or short hauls. Tractor is equipped with a 225-hp. diesel engine and extra large 21:00 by 28 tires, for maximum traction and flotation. It has four speeds forward and one reverse. Top travel speed is 18 miles per hour at 1,800 r.p.m. Tractor has fuel capacity of 104 gal. which is sufficient for 12 to 15 hours operation. The scraper is a positive forced ejection type, operated by air-actuated cable-power control unit, mounted on the rear of the tractor and deriving its power from the main engine. Steering of unit is accomplished by two double-acting hydraulic jacks which are positively controlled by a fluid power unit mounted on the front of the tractor. *La Plant-Choate Manufacturing Co., Inc.*

IT'S NEW CHECK IT

(3) SQUIRREL-CAGE INDUCTION MOTOR is for such high-speed applications as boiler-feed pumps, oil pipe-line pumps, centrifugal pumps, compressors and blowers. Motor is two-pole type; rated from 200 to 700 hp. at 3,600 r.p.m.; N.E.M.A. Class B starting (normal torque, low current), favorable for across-the-line starting. Drip-proof construction; fabricated steel frame. Features which meet requirements of high-speed service are: Kolene process centrifugally cast bearing sleeves; pressure-lubricated bearings; split-bearing brackets (doweled) permit easy access to bearings; windage noise lessened by design to avoid abrupt acceleration of air; phos-copper braze-welded cage winding. *Electric Machinery Mfg. Co.*

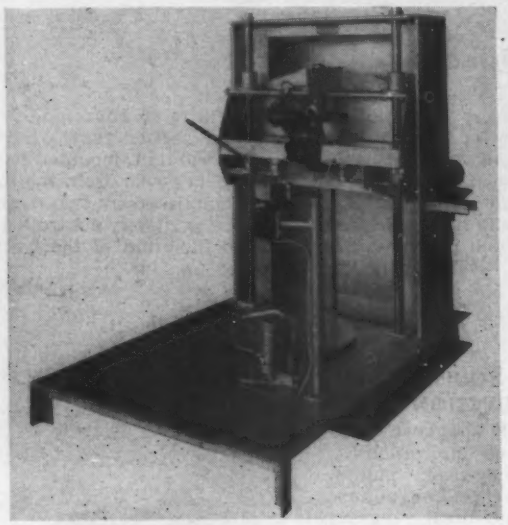
IT'S NEW CHECK IT

(4) ELECTRO-HYDRAULIC CHIME MACHINE reconditions chimes of used steel drums. It straightens chimes, stops chime leaks, and will remove head or bottom from steel shipping drums. Drum is placed on self-centering revolving steel disk and against hardened steel ball-bearing driving wheel driven by a self-contained 1½ hp.

The Oil and Gas Equipment Digest presents a review of what is new in equipment and trade literature . . . makes it possible for readers to obtain full information on every subject by use of convenient "Check It—Mail It" service card. This periodic feature of The Oil and Gas Journal will include all that is new in equipment . . . at a time when new products are being introduced, and existing products improved.

Keep Informed. Save Time. Tear Out Card. Check It. Mail It.

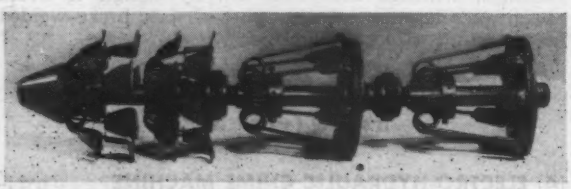
electric motor through speed-reduction roller-chain drive. Drum chime is then clamped against driving wheel by a specially shaped ball-bearing hardened-



steel pressure wheel through which hydraulic pressure can be exerted by operator through foot-operated pressure pump, which has a contact pedal, pressure pedal, and a release pedal. Two other ball-bearing hardened-steel wheels exert a triangular pressure which brings the chime into round. *L. M. Gilbert Co.*

IT'S NEW CHECK IT

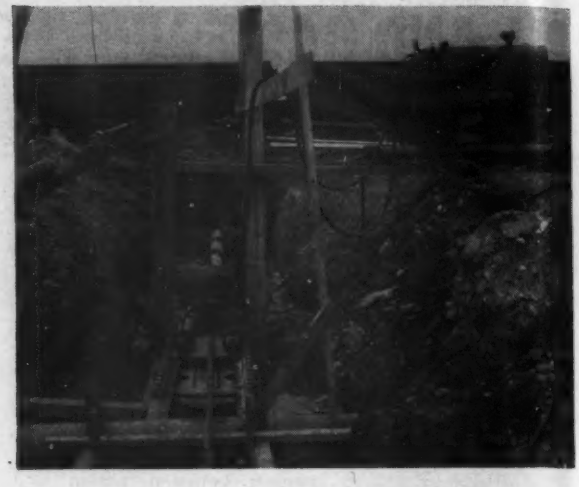
(5) NEW PIPE-LINE SCRAPER is so designed that the entire pipe surface receives two complete scrapings as the tool goes through the line. Body of scraper is of heavy brass tubing with a ported front-end nozzle



through which a small amount of oil is bypassed. This washes paraffin ahead of the scraper as it is cut loose by the tungsten-carbide-tipped cutting knives. Body has two hollow ball unions, which makes for more flexibility and shorter bends in the pipe line. Tool has only 12 separate parts. *Carver-Stimpson Pipe-Cleaning Co.*

IT'S NEW CHECK IT

(6) UNDER-ROAD BORING MACHINE installs large-size pipe through sand, gravel, shale, slate, etc. Machine is a horizontal rotary drill, using pipe or casing that is to be installed for carrying the rotating cutter head. In operation boring machine is placed in ditch and power unit is set up on bank at the side. Power is transmitted by means of an adjustable drive shaft with universal joints to the upper sprocket of a chain-and-sprocket



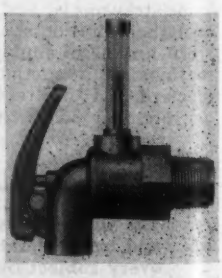
drive which can be set at the desired height. Hydraulic cylinders force the pipe forward as it rotates. Operator can control the rotating and forcing of pipe forward from his position at the power unit. *Young Engine Corp.*

IT'S NEW CHECK IT

(7) SWING CHECK VALVE for use with manufactured, natural, or liquefied petroleum gases, are precision machined for tight seating to prevent flow from seeping back through the check. Disk opens fully providing full flow through the valve with minimum resistance. Disk mechanism has free action and will not stick on minimum flow. Valves are noiseless in operation, rugged in construction, and have a high safety factor. *Pokorney Manufacturing Co.*

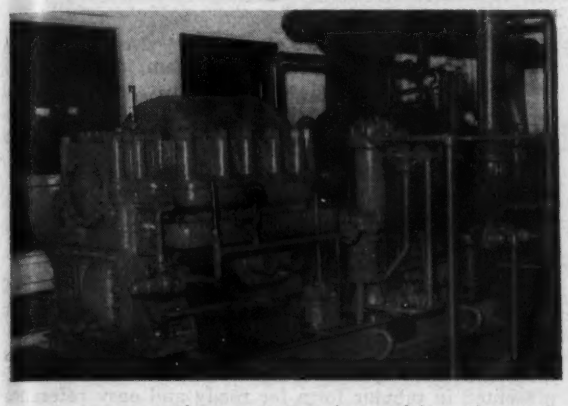
IT'S NEW CHECK IT

(8) DRUM GAGE FAUCET eliminates guesswork, disappointment, and does away with messy "yardstick" measuring. Gage is placed for easy recording while drawing contents of the drum. Zamac and plastic components make gage practically indestructible with normal use. Faucet has large orifice for fast flow and is guaranteed leakproof. Valve seat and diaphragm are of Neoprene. Accommodates padlocks with ¼-in. hasp. *C & C Die Castings Co., Inc.*



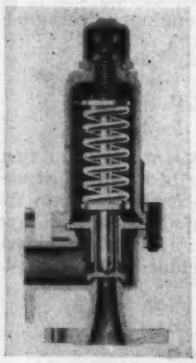
IT'S NEW CHECK IT

(9) NEW CENTRIFUGAL COMPRESSOR handles hydrocarbon gases from low molecular weights of methane ethylene through the range including air and up to propane and butane. Unit can be used as straight gas



compressor or as the compressor in a refrigeration cycle. Unit may be direct connected to high-speed steam turbines or through a stepup gear to motor or prime mover. Capacity range varies from 1,500 cu. ft. per minute inlet volume up to 25,000 cu. ft. per minute. All necessary equipment, including auxiliary oil pumps and oil coolers, can be mounted on a common structural-steel base. *Carrier Corp.*

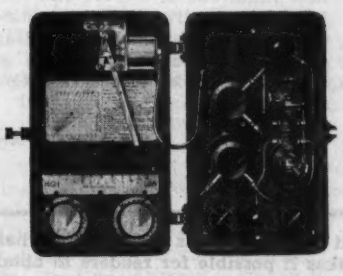
IT'S NEW CHECK IT



(10) CORROSION RESISTANT VALVE, of the safety and relief type, reduces valve maintenance costs on installations handling corrosive vapors or gases. Hastelloy-C, a nickel-iron alloy containing molybdenum, silicon, and copper, is used in inserted nozzle and valve disk and in certain models for the complete valve body. All working parts of valve are isolated behind a vaporproof "FarriSeal" curtain, which is a protective flexible material attached to the disk at one end and flanged disk at the other. *Farris Engineering Corp.*

IT'S NEW CHECK IT

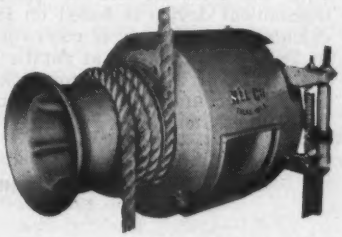
(11) DUAL-PILOT LEVEL-TROL, of the displacement type for indicating or recording and controlling of liquid levels, has two distinct pilot circuits for each function of operation. Unit can be installed and indicator portion set to indicate or record level over the full float range and then locked in position. Control function is handled by the second pilot, which may be adjusted by the operator without danger of disturbing indication or recording of level wtihin the vessel upon which unit is located. Unit also offers a visual indication of level in the vessel to the field operator



through use of a clear-vision scale in case door. Scale is operated pneumatically by level-indicator pilot only, and is not subject to being thrown out of calibration when controller adjustments are made. *Fisher Governor Co.*

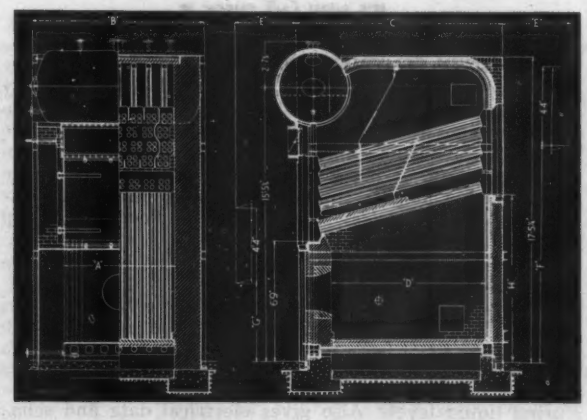
IT'S NEW CHECK IT

(12) NONFOULING CATHEAD is equipped with safety catline spool. Unit is available in both the spinning-line and breakout catheads, either hydraulic or mechanically controlled, with large or standard spool. Spinning line cathead (illustrated) shows the metal finger attached to the stationary flange. Feature prevents line from crossing over and fouling. Hook beneath the spool holds line in working position. Completely equipped with antifriction bearings, friction facing has been enlarged for greater power. *Ben F. Kelley Co.*



IT'S NEW CHECK IT

(13) STANDARD WATER-TUBE BOILERS range in guaranteed steam generating capacity from 6,000 to 17,000 lb. of steam per hour. New boilers feature a water-cooled furnace design which maintains uniformly high efficiency over a wide range of load conditions. Boilers are



made with two standard tube lengths, 10 ft. and 12 ft. expanded into sinuous electric-steel sectional headers. Furnace width varies from 3 ft. 9 in. to 9 ft. depending on whether 4, 5, 6, 7, 8, 9, or 10 header sections are used. All boilers have 48-in. diameter welded, X-rayed, and stress-relieved steam drums built to various pressure standards ranging from 160 to 320 lb. Over-all setting height is 17 ft. 5¼ in. for all units. *Springfield Boiler Co.*

IT'S NEW CHECK IT

TRADE LITERATURE

(14) FLEXIBLE CONNECTORS AND EXPANSION JOINTS. New 60-page catalog on packless expansion joints and flexible couplings contains many usable data on specific applications. Profusely illustrated. *Zellea Brothers & Johnson.*

IT'S NEW CHECK IT

(15) TON-MILE CALCULATOR evaluates the performance and working life of rotary drilling lines. Handy mechanical device is based on latest A.P.I. formula for calculating ton miles. If common weights of 3½ or 4½-in. drill pipe are used at depths between 500 and 18,000 ft., a turn of the calculator disk gives the formula ton miles per round trip. New device gives quick answers. *Bethlehem Steel Co.*

IT'S NEW CHECK IT

(16) NEW MAP FILE. A four-page folder describes new type map and tracing tubular-filing units. Protection of large drawings and ease in finding the drawing needed is emphasized in descriptive material. Illustrated. *Scott-Rice Co.*

IT'S NEW CHECK IT

(17) TEMPERATURE AND PRESSURE INSTRUMENTS. Complete illustrated catalog describes various products of manufacturer in quick, easy-to-read style. Index lists many types of thermometers, hydrometers, recording gages, controllers, diaphragm motor valves, temperature and pressure regulators, bucket-traps, and air filters and air guns. *H. O. Trerice Co.*

IT'S NEW CHECK IT

(18) UTILITY CENTRIFUGAL PUMP. New two-color bulletin covers two types of economical, general utility centrifugal pumps, with power drives from fractional to 20 hp. Types covered are an integrally coupled electric unit in which pump and driving motor are anchored on motor footing, and a belt-driven unit with iron frame and bearing mounts supporting various pump sizes integrally cast. *Peerless Pump Division, Food Machinery Corp.*

IT'S NEW CHECK IT

(19) TANK GAGING. New eight-page bulletin describes mechanical and electrical equipment for measuring liquid levels. Also gives electrical data and schematic diagrams for remote instrument registration. *Smith Meter Co.*

IT'S NEW CHECK IT

(20) GRID UNIT HEATERS. A 12-page, 2-color bulletin describes one-piece construction steam or hot-water heater for refineries, plants, warehouses, etc. Material includes graphs showing air spread, diagram hook-ups, and capacity tables for different models. *D. J. Murray Manufacturing Co.*

IT'S NEW CHECK IT

(21) PHYSICAL PROPERTIES OF SYNTHETIC ORGANIC CHEMICALS. A 12-page booklet has been designed as a condensed guide for users of organic chemicals. It contains data on applications and physical properties for more than 175 synthetic organic chemicals. Material is presented in tabular form for ready and easy reference. *Carbide & Carbon Chemicals Corp.*

IT'S NEW CHECK IT

(22) CONSOLIDATED RIG. New 20-page bulletin describes the Ideal Consolidated Rig Type 125 designed for fast and economical drilling of oil wells to depths of 15,000 ft. Seventeen photographs show rig and its features. Included also are a detailed description of features of the rig, complete operating, lubrication, and draw works specifications, a shaft speed diagram and two dimensional drawings showing the use of both the three-engine power group and the four-engine power group. *National Supply Co.*

IT'S NEW CHECK IT

(23) FIRE-FIGHTING EQUIPMENT. Maintenance of first-aid fire fighting equipment is described and illustrated in new eight-page bulletin. Article is divided into five sections: (1) Vaporizing liquid type; (2) soda acid type; (3) foam type; (4) antifreeze type; (5) carbon dioxide type. Extinguisher-type charts included. *American-La France-Foamite Corp.*

IT'S NEW CHECK IT

(24) ALUMINUM COVERED STEEL BUILDINGS. Information for planning any type of industrial or commercial construction is presented in new booklet. Emphasizes how hundreds of buyers and their contractors are beating high construction and labor costs by completing in weeks rigid-frame steel buildings for plant expansion, storage space, machine shops, warehouses, and display rooms. *Butler Manufacturing Co.*

IT'S NEW CHECK IT

The Oil and Gas Equipment Digest presents a review of what is new in equipment and trade literature . . . makes it possible for readers to obtain full information on every subject by use of convenient "Check It—Mail It" service card. This periodic feature of The Oil and Gas Journal will include all that is new in equipment . . . at a time when new products are being introduced, and existing products improved.

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The Refiner's Notebook

A WEEKLY FEATURE OF THE OIL AND GAS JOURNAL

Vacuum and Close-Clearance Pumps

LOSS of suction due to vapor locking is illustrated in Fig. 1 which shows a vapor-bound pump which is handling a hot liquid. Refer also to The Refiner's Notebook No. 155 (August 2, 1947) entitled, "Suction Lift of Pumps."

Liquid will tend to be held up in the suction line to a height equal to the atmospheric pressure (34 ft. of 60° F. water or 14.7 psia.), except that the liquid exerts its vapor pressure. As the pressure in the suction line is decreased by action of the plunger, the pressure finally gets down to the vapor pressure of the liquid and it starts to boil or vaporize. Thus, the pressure in the suction line below the suction valve can never be lower than the vapor pressure of the liquid being pumped. The Refiner's Notebook No. 155 pointed out that the actual or true vapor pressure (bubble point) of the liquid must be determined experimentally because the customary Reid vapor pressure is not accurate for "gassy" or aerated liquids.

Pump Mechanism

The pump mechanism has nothing to do with the maximum lift which has just been discussed—it amounts simply to the atmospheric pressure less the vapor pressure of the liquid. However, the suction lift is further reduced by the weight or spring of the suction valve, friction losses through the suction line, and the friction losses through the valve and inlet to the cylinder. In extreme situations, the pressure required to lift the suction valve can be reduced to a minimum by removing the spring that is ordinarily used to hold the valve firmly in position, and even to obtain a lighter-weight valve. The pressure to lift the valve (without a spring) can be computed by dividing its weight to its cross-sectional area. The weight of customary valves seldom exceeds about 0.5 psi. of surface.

Of course, the area of the suction line and inlet ports should be very large so that friction through them is negligible. In some hot-oil reciprocating pumps the inlet and discharge ports extend halfway around the cylinder and they may extend an inch or so along the wall of the cylinder that is covered by the stroke of the piston or plunger. Liquid valve velocities should be kept below 160 ft. per minute for volatile liquids.

Eliminating Head of Liquid

Finally, the head of liquid that is entrapped just above the suction valve in Fig. 1 can be eliminated by setting the suction valve and its pot right in the side of the cylinder wall. This is a common arrangement in the so-called close-clearance, low-clearance volume, side pot pumps employed in pumping highly volatile liquids. The piston or plunger of such pumps at the end of the stroke wipes out all but 10-17 per cent of the entire cylinder volume. In handling volatile liquids or liquids at their boiling point, pump speeds should be:

Stroke (in.)	Speed (ft./min.)
6	25-40
10	32-57
12	35-63
18-24	45-80

In vacuum service the suction line and valve losses can be eliminated almost completely by immersing the pump (mainly centrifugal or rotary) in the liquid. However, this introduces mechanical difficulties with expansion at high temperatures. Leakage of air through the stuffing boxes of rods or shafts can be alleviated by the use of deep stuffing boxes and operation at a low speed. In addition, an auxiliary stuffing box can be employed so that liquid from the discharge side of the pump is circulated between the two stuffing boxes. Centrifugal pumps of the self-priming types or those equipped with pickup blades which turn the liquid smoothly into the path of the impeller blades, now operate successfully on hot or volatile oils, or in vacuum service.

For ordinary pumping conditions the "entry" losses, i.e., losses through the suction line and suction valve are:

Self-priming pumps—1.7-3.7 psi.

Rotary or reciprocating—3.7-4.3 psi.

Centrifugal pumps—3.7-7.4 psi.

By proper attention to the many factors mentioned herein, it is possible to operate with a positive suction head of only 4 ft. when pumping 700° F. boiling liquid mixed with even 40 per cent of fuller's earth and at a pressure of only 1 in. of mercury in the suction vessel. In this particular case the weight of the valve (no spring) contributed 0.4 psi. (1.4 ft. of fluid) and the entrance losses 0.76 psi. (2.6 ft.). However, positive heads of 8 ft. or more are recommended for such services.

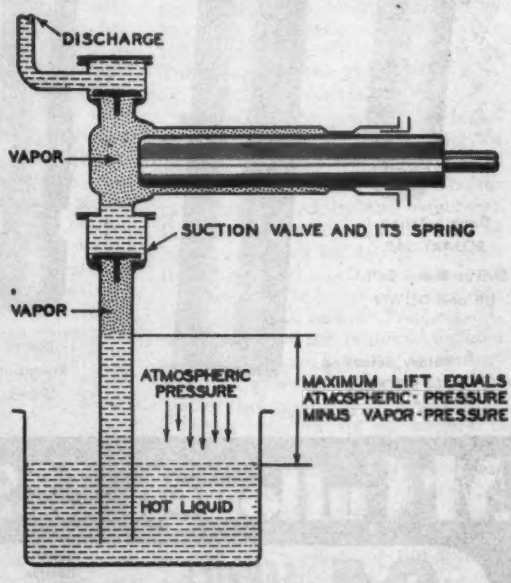

Fig. 1—Vapor-bound hot-oil plunger-type pump

No. 159 in a series by W. L. Nelson, professor of petroleum refinery engineering, University of Tulsa

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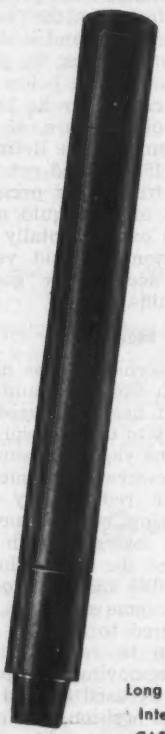

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shows just
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is stuck

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MODERN Rotary DRILLING

Steam-Generating Plants—1

TO supply the large power demands of modern drilling, outlined in the preceding installment of this series, a rotary rig of today possesses a greatly increased power plant, in comparison with rigs of yesterday. In the case of steam rigs the trend of development was along the lines of increasing the sizes, capacities, and working pressures of the equipment previously used. Some steam equipment differing considerably in design from the conventional forms is now contemplated or is in process of testing. However, the equipment commercially available and actually used is still of the type previously used except that sizes and pressures have been increased, efficiencies improved, and a number of refinements in details of construction added. Power rigs represent a relatively recent development. Opportunity was therefore present from the beginning to meet the high power demands of present-day drilling with prime movers of newest design and with novel and efficient methods of compounding the power for different specific functions of the rig.

Steam rig.—Beginning with the steam rig, subjects for consideration are the steam-generating plant and the steam engine, through which the steam power is utilized. The direct-acting steam pump is included in the discussion of the circulating system of the rig.

From many points of view steam is still the most satisfactory source of power for operation of the rotary rig. Efficiency and simplicity of distribution of power to the different power elements of the rig, without the need for mechanical transmission or mechanical compounding arrangements, is one of these points. Extreme flexibility, reliability, and simplicity of a steam engine are other points. Another is large capacity of a direct-acting steam pump, essential in certain areas, and the pump's flexibility. However, from the point of view of fuel and water consumption, a steam rig is highly uneconomical. Also, the large steam-generating plant of a modern rig presents an additional moving and rigging-up problem.

The above outlined characteristics of a steam rig define closely the field of its satisfactory application. In certain areas, such as Texas-Louisiana Gulf Coast, where large mud-circulating requirements are a primary requirement, where field gas may be frequently used as fuel, and where supply of good water is plentiful, the steam rig still retains its important position, although it is meeting an increasing competition from power rigs in shallow and medium-depth drilling. In other areas, where fuel has to be purchased and where good water is difficult to secure the power rig has largely displaced the steam rig. To a large extent this is also true so far as exploratory drilling is concerned.

Steam requirements.—Steam consumption while drilling represents the main problem of a steam rig. This consumption consists of steam demand of pump, rotary and boiler, and rig auxiliary equipment. A 20-in.-stroke pump may use in normal operations around 45,000 lb. of steam per hour. However, pumps of that type use around 60 or more pounds of steam per horsepower hour and when operating at higher rating would require considerably more steam. The rotary and boiler-auxiliary equipment use around 15,000 lb. of steam per hour. To this should be added the steam consumption of the rig-auxiliary equipment which may be operating at any given time.

As far as hoisting is concerned, the maximum steam consumption of a 14 by 14-in. steam engine commonly used with heavy rigs, is around 49,000 lb. of steam per hour. In case of hoisting it is not so much the steam demand as the steam-demand changes that may affect the satisfactory operation of the boilers.

Steam generation.—Large steam demands of a heavy rig require ample capacity of the steam-generating plant if the boilers are to be operated at a reasonable percentage of their rating and if a reasonably trouble-free boiler service is to be attained. Consideration must be also given to the temporary decreases in boiler-battery capacity, when one of the boilers is down for repairs or washing.

A definite trend is now apparent toward use with heavy rigs of 150-hp., 350-psi. working-pressure boilers. Five boilers are frequently used and addition of a sixth is considered by some operators. The five-boiler arrangement permits meeting of the steam demand within the limits of efficient boiler-operating practices. Assuming generation of 5,000 lb. of steam per boiler per hour, at 100 per cent rating, a 60,000-lb.-per-hour steam demand permits operation of boiler at 240 per cent of rating.

Superheated boilers of 150 hp., and 500 psi. working pressure are available, although their use so far is not widespread. They offer all the advantages of superheated steam.

Steam distribution.—With large volumes of steam used, increasing attention is being paid to the size of steam lines, in order to reduce to a minimum the pressure drop. Six-inch lines are generally used although changes to 8-in. lines are being made. For 60,000 lb. of steam per hour with initial pressure of 350 psia., the pressure drop per 100 ft. of 6-in. line is around 4 lb. This drop may be reduced to 1 lb. by use of 8-in. line.

Rating.—Boiler horsepower is defined as equivalent evaporation of 34.5 lb. of water from and at 212° F. per hour. Commonly used boiler rating, accepted by the American Petroleum Institute, is 10 sq. ft. of heating surface for 1 b.hp. because the area of 10 sq. ft. is capable of evaporating 34.5 lb. of water per hour from and at 212° F. The heating surface of the boiler is defined as the total area actually in contact with hot gases on one side and water on the other.

While this rating of boilers is still being used, changes in design of modern drilling-rig boilers permit actually much better development of boiler horsepower. These improvements and changes will be one of the subjects of the following installment.

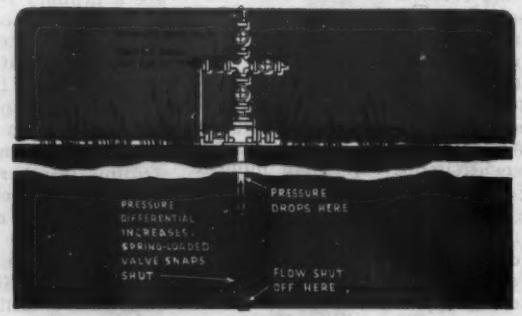
No. 35 in a series by Joseph Zaba, petroleum engineer, Houston

Otis Removable Tubing Safety Valve automatically shuts off flow in damaged well located near big Louisiana bridge

1 "On July 3, 1942, we received a request from a major company to install an Otis Removable Tubing Safety Valve in one of their Westwego Field wells. Inasmuch as this 7000 foot well had been completed in the low marshy land near the Mississippi and less than a mile from the Huey Long Bridge, New Orleans, the company was fully aware of its vulnerability to high water and the damage which might occur to local transportation and property in case surface connections ever failed or became damaged and allowed the well to flow wild.

2 "Since the tubing had already been run, we chose to install a Type FB Safety Valve which can be set at any desired depth. We then observed flow tests and selected an orifice for the Safety Valve bean which would allow a desired maximum rate of flow at 1700 p.s.i. and set the compression of the coiled spring, which holds the Valve in an open position, to equal a differential pressure of 500 p.s.i. In other words, in case the upward thrust of the pressure differential across the flow bean exceeded that of the spring, the valve would automatically close and shut off all flow through the tubing.

3 "On March 7, 1943, nine months after this installation had been completed, the company called again and asked us to send a service crew to this same well as soon as possible. When we arrived we learned that flow had stopped and that they wanted us to pull the Safety Valve, clean the well, re-set the Safety Valve, and put the well back on production. Inasmuch as it had been operating normally at 1700 p.s.i. on the previous day, it was their belief that the well had sanded up. When the crew arrived they rigged up our regular wire line equipment used to run and pull Otis Removable Sub-Surface Controls and checked for sand. However, they found none.



4 "Further inspection revealed that Xmas tree connections were practically cut off and damaged beyond repair. The surface choke was completely cut out and the wing valve was so badly damaged that it would not close. Thus, it was immediately evident that our automatic "Storm Choke" had performed its job quickly and efficiently. When surface connections began to fail the increase in rate of flow caused an increase in differential across the Safety Valve in excess of that for which the Valve was set, and the automatic mechanism snapped shut and prevented disastrous uncontrolled flow through the tubing.

5 "Needless to say, this company is thoroughly 'sold' on the installation of Otis Removable Tubing Safety Valves in wells completed near rivers, highways, industrial areas or townsites, and in other critical zones. Although they had maintained constant check on this particular well, connections failed without warning, and only by their foresight of having installed automatic sub-surface protection was incalculable damage and financial loss avoided."

This is the fourth in a series of advertisements covering actual installations of Sub-Surface Controls and subsequent service as described by Otis Pressure Control, Inc., field personnel. Except for necessary deletion of company and trade names these reports are unedited. For further details on equipment and service, write Otis Pressure Control, Inc., P. O. Box 7206, Dallas.

(T-5)

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ENGINEERING *fundamentals*

Methods of Measuring pH—1

Colorimetric Method

THE colorimetric method is the cheapest and the simplest of all methods of pH measurement. Readings may be made quickly and such a method is usable where great accuracy is not required. In the colorimetric method of pH determination, a few drops of an "indicator" is added to the solution being tested. The color of the resulting mixture is then matched against the color of a "standard," which may be a colored strip of paper, colored glass, or other solutions of known pH containing the indicator. The pH of the test solution is thus estimated by a visual matching of colors.

Obviously there are limitations to the method, such as dependence upon acuteness of vision and inapplicability to colored or turbid solutions. The most serious criticism of the colorimetric indicator method, however, lies in the less obvious limitations, of which the user may be unaware and which may lead to costly errors.

1. Temperature effect.—In general, temperature is ignored in colorimetric measurements, since the method is in most cases not sufficiently accurate to justify temperature control. With certain indicators the temperature error is small, but with others this error can be of considerable magnitude. For example, with phenolphthalein, an error of 0.15 pH per 10° C. is encountered.

2. Solvent effect.—When an organic liquid like alcohol, having a lower dielectric constant than water, is added to an aqueous solution, the pH indications are markedly effected. Some indicators will show a pH value much higher than the true value; others will show a much lower value—there is no simple way of estimating the magnitude of the error. In general, it may be stated that in the case of such solvents colorimetric pH determinations which are made by comparison with aqueous standards are in error.

3. Oxidation-reduction.—Since the indicators are in the nature of organic dyes, they are very often bleached by oxidizing or reducing agents, causing false color indications.

4. Salt effect.—The indicated pH of a solution depends on the total concentration of chemical substances of all types dissolved in the solution. Thus, an error is encountered if the total concentration of dissolved chemical substances in the solution to be tested by an indicator is different from that of the reference or standard solution to which comparison is made. Errors of 0.1 to 0.2 pH units from this source are common. To recapitulate, the colorimetric method has the advantages of simplicity and low initial cost. If one is dealing with only slightly colored solutions of such composition that errors caused by the above effects are not significant, and if accuracy is not required, the colorimetric method is recommended because of low initial cost. If, however, the measurement of pH is important and errors from the above effects are to be avoided, other means must be employed.

Electrical Method

In the electrical method of pH measurement, the solution to be tested becomes the electrolyte of a voltaic cell. One of the electrodes is a "Reference Electrode," the voltage of which remains constant with respect to the solution, unaffected by changes in pH of the solution. The other electrode is of such a nature that its voltage is affected by changes in pH of the solution. The relationship between the voltage of the cell and the pH of the solution has been well established by theory and experiment for several types of electrodes, so that if the voltage of a given cell is measured, the pH of the solution within the cell may be determined.

The reference electrode is usually a "Calomel Electrode;" the other electrode may be one of several types.

1. The reference electrode.—The saturated potassium chloride calomel electrode has long been recognized as most satisfactory for making electrical connection with the test solution. Its potential with respect to the test solution is constant and is easily reproducible. Its use involves a minimum of difficulty with liquid junction potentials.

2. The hydrogen electrode.—The hydrogen electrode usually consists of a specially coated platinum wire or foil which dips into the solution and around which an atmosphere of hydrogen is maintained. It is of considerable theoretical interest and is capable of giving results of high accuracy in many cases. As a practical electrode, however, there are many drawbacks. It is inconvenient, since it requires either a tank of hydrogen or a hydrogen generator with purifying equipment. The hydrogen gas, passing through the solution, may alter the original pH by sweeping out dissolved gases, such as CO_2 or SO_2. Traces of oxygen seriously interfere with the measurements. Various substances, such as arsenic trioxide, and hydrogen sulfide, poison the electrode. Organic matter usually causes trouble, either by absorption, as with protein, or by actual hydrogenation at the electrode. Measurements cannot be made in the presence of oxidizing agents, such as ferric iron or chromate, nor in the presence of metals below or just above hydrogen in the electromotive series. Neither can measurements be made in the presence of reducing substances, such as stannous chloride or sulfites. It is apparent that although the hydrogen electrode is of interest for certain laboratory measurements, it is not a useful electrode for general application.

3. The quinhydrone electrode.—This electrode usually consists of a platinum or gold wire which dips into the test solution to which an excess of solid quinhydrone is added. Although the solid quinhydrone **must** be added to the solution, equilibrium is usually quickly attained. The upper pH limit is about 8.0 on well buffered solutions and considerably less on slightly buffered solutions. Quinhydrone reacts with many substances, organic materials such as phenols, amines and amino acids, as well as inorganic oxidizing and reducing agents. Boric acid forms a complex which prevents accurate measurement. There is also a salt error which is important in certain cases.

The quinhydrone method is convenient, but is often accompanied by many errors.

Contributed by Southern California Meter Association. Author: N. E. Swanson, Los Angeles, The Foxboro Co.

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With No Investment—Without Responsibility

Pictured above is the tool room and machine shop of the Tool and Mold Division of Murray Rubber Company. Completely equipped with the latest model machine tools and manned by experienced oil field equipment engineers, and machinists. The Tool and Mold Division is dedicated in its entirety to the production of customer's molds, metal inserts, dies, jigs, fixtures and other precision machine work.

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TOOL & MOLD DIVISION

HOUSTON, TEXAS

REFINING

Synthetic Rubber Use Shows Marked Decline

Consumption of synthetic rubber dropped 23.57 per cent, from 409,493 to 312,982 long tons, during the first 6 months of 1947, while total rubber consumption climbed from 494,018 long tons in the first half of 1946 to a new record of 571,774 long tons during the first half of 1947.

Consumption of natural rubber showed the greatest increase, 206.17 per cent, climbing to 258,792 long tons during the first half of this year, compared with 84,525 during the same period a year ago. Reclaimed rubber use increased 12.59 per cent, from 131,091 long tons during the first 6 months of 1946 to 147,593 long tons this year, according to Rubber Manufacturers Association, Inc.

Of the types of manufactured rubber, only neoprene showed an increase, climbing from 20,058 to 21,031 long tons.

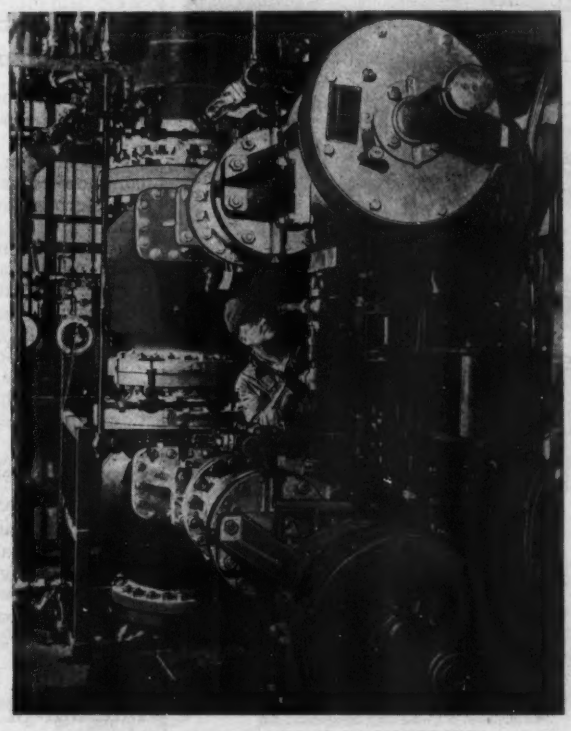
Synthesis Equipment of Germans to Be Studied

A collection of German equipment employed during the war in the production of synthetic liquid fuels has been brought to the United States for detailed study by the Bureau of Mines.

The equipment has been consigned to the Missouri Ordnance Works, near Louisiana, Mo., which now is being converted by the Bureau to a synthetic fuels demonstration plant for obtaining oil and gasoline from coal.

The shipment includes a 130-ton hydrogenation - process converter, 60

SLIDE VALVES IN NEW TEXACO FLUID UNIT



Two slide valves, which are critical control mechanisms in catalyst flow, are used in series in the main catalyst stand pipe of the new Fluid catalytic cracker at the Casper (Wyo.) refinery of The Texas Co. The hot (1,100° F.) regenerated catalyst passes down the regenerator stand pipe through these valves, on its way to flash vaporize the gas oil feed to the Fluid unit. The gaseous mixture of oil and catalyst then flows to the reactor where cracking is completed. The slide valves are hydraulically controlled, the valve-positioning mechanisms appearing in the foreground. Six of the seven slide valves on the unit are enclosed to protect them from extreme weather conditions and to facilitate observation and service. Two slide valves are provided for controlling the rate of catalyst flow; normally the top one is in wide-open position on a standby basis while the bottom one only is used for control. Pressure drop across the slide valves has been reduced by lowering the stand-pipe heights. This in turn has reduced the velocity of the catalyst going through the valves with a consequent reduction in metal wear. Design and construction of this small Fluid unit was by M. W. Kellogg Co. (An article on the installation appeared in The Oil and Gas Journal, August 23, page 73)

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"TRANSPARENT"
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LIQUID LEVEL GAGES

Used to observe color and density of liquids under high pressures and/or temperatures. Construction exceptionally sturdy. Made of alloy temperature resisting steel, and are highest quality throughout. Liquid chamber made from solid block of steel to assure perfect alignment and rigidity. Conform with A.P.I.—A.S.M.E. requirements.

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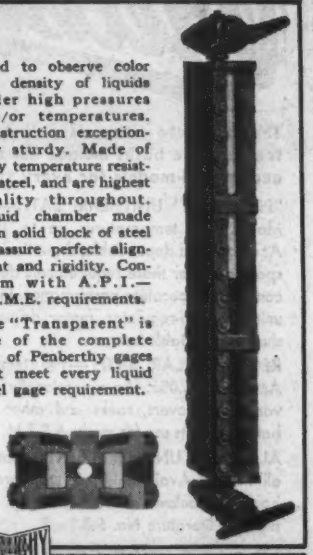

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The complete "Precision" line of constant temperature baths include hundreds of standard and special models for every type of laboratory.

"PRECISION" UNITHERM BATH—Pyrex Glass Visibility Model. For temperatures up to 100c. Accuracy ±.03c. Accurate and dependable, these "unitherm" baths are designed specifically for those requirements demanding the highest level of constant temperature performance. Includes immersion heating units, Thermo-regulator, motor driven stirrer and perforated shelf or adjustable hangers.

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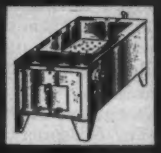
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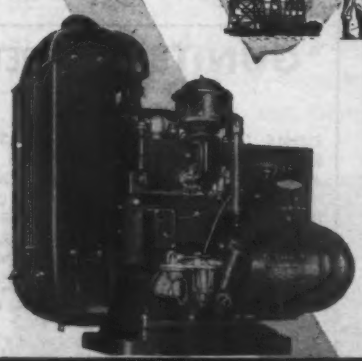
Lighting Survey Power Tools Pumps



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Lightweight one or two-cylinder heavy-duty, air-cooled models for maximum portability. Onan two, four and six-cylinder water-cooled plants for continuous operation, stationary or mobile.

ONAN ELECTRIC PLANTS—A.C.—350 to 35,000 watts in standard voltages and frequencies; D.C.—600 to 10,000 watts, 115 and 230 volts. Battery chargers—500 to 6,000 watts, 6 to 115 volts. ONAN AIR-COOLED ENGINES—CK: 2-cylinder opposed, 10 h.p.; BH: 2-cylinder opposed, 5.5 h.p.; 1B: 1-cylinder, 2.5 h.p.

WRITE FOR SPECIAL FOLDER

D. W. ONAN & SONS INC.
2734 Royalston Ave. Minneapolis 5, Minn.

ONAN ELECTRIC PLANTS

ft. long and cylindrical in form with a maximum diameter of 7 ft. Other equipment, which will be used as a guide in preparing American designs, includes a 10 by 18-ft. gas synthesis process converter, a 4 by 60-ft. "wickel-ofen" type heat exchanger, two 6 by 30-ft. coal paste injectors, and a 3 by 50-ft. hairpin bend from a paste-preheater.

A Linde-Frankl oxygen plant unit with a capacity of 25,000 cu. ft. of oxygen per hour also has been received and will be reassembled at Louisiana for use in synthetic fuels experiments. A DeLaval centrifuge and special purpose valves, fittings, lens gaskets, and instruments also were received.

Included in the shipment are 580 drums of various types of hydrogenation-process catalyst.

McCarthy Chemical Co. Starts Work on New Plant

McCarthy Chemical Co., subsidiary of McCarthy Oil & Gas Corp., has begun work on a $3,000,000 chemical plant at Winnie, Chambers County, Texas.

The new plant, which will make plastic materials, will be erected next to the absorption plant of McCarthy Oil & Gas Corp.

Shell Establishes New Asphalt Laboratory

A new laboratory at Wood River, Ill., has been established by Shell Oil Co., Inc., to study asphalt and its application, to isolate and correct common causes of road failure, and to determine new uses for the material.

An outstanding piece of equipment to be used is a miniature with which paving specialists will prepare experimental quantities of paving materials exactly as they are formulated in full-scale paving operations.

Highway departments are cooperating with Shell in their investigations and research.

Storage Being Built

EDMONTON, Alt.—British-American Oil Co. has commenced construction here of a $100,000 extension to its bulk storage plant. Some 16 new storage units will provide 304,000 gal. additional capacity, for aviation gasoline, gasoline, diesel fuel, and tractor distillates.

Manual of Phenol Released

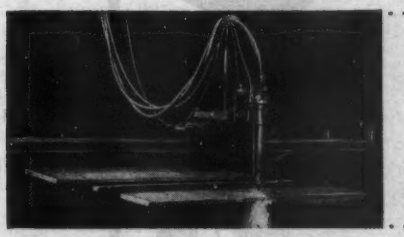
A new manual, sixth in the Manufacturing Chemists' Association tank-car series, which covers recommended practice of all phases of unloading operations and handling precautions for phenol is now being distributed by the association.

"Tailored steel" becomes a regular steel warehouse commodity when an OXWELD shape-cutting machine is used.

LINDE process service cuts production corners

You may be taking advantage of all of the more apparent economies of LINDE methods. Yet, through the broad and comprehensive experience of the LINDE service organization, important additional savings may be made.

LINDE Process Service is available to all LINDE customers through any LINDE office.



Stainless steel plate, difficult to oxygen-cut by usual methods, can be quickly cut to size and shape by powder-cutting.

Scrubbing steel with a brush of flame removes scale, rust, and surface moisture prior to painting. This is flame-priming, a LINDE development.

HELIARC welding makes strong, clean welds in stainless steel tubing because the weld zone is protected from oxidation by a protecting envelope of argon or helium gas.

The design of a simple jig for centering cold rounds—or the design of a completely mechanized flame-conditioning installation — are examples of LINDE Process Service.

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The words "Linde", "Oxweld" and "Heliarc" are registered trade-marks of Units of Union Carbide and Carbon Corporation.

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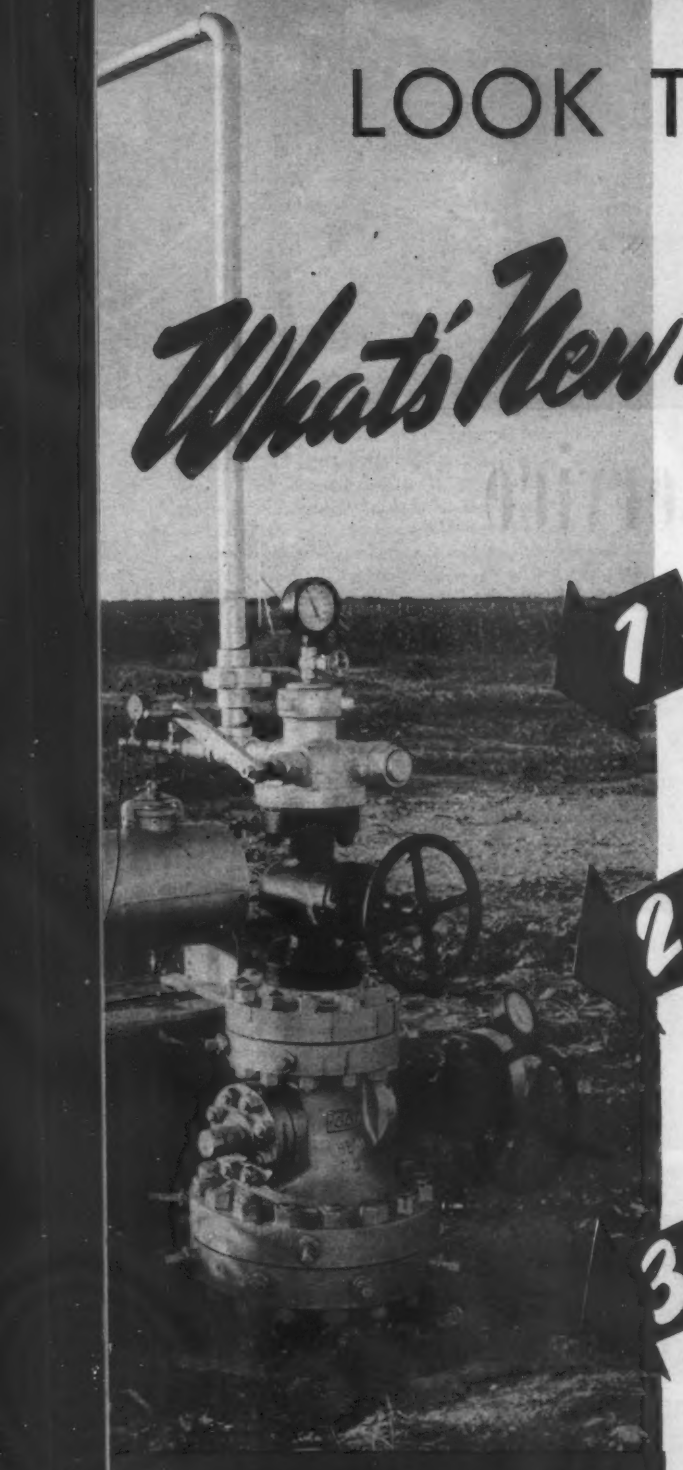
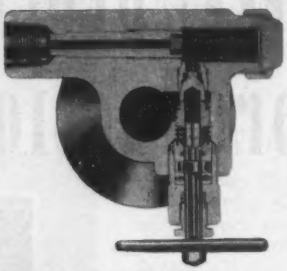
LOOK TO O·C·T FOR

What's New in Well Heads

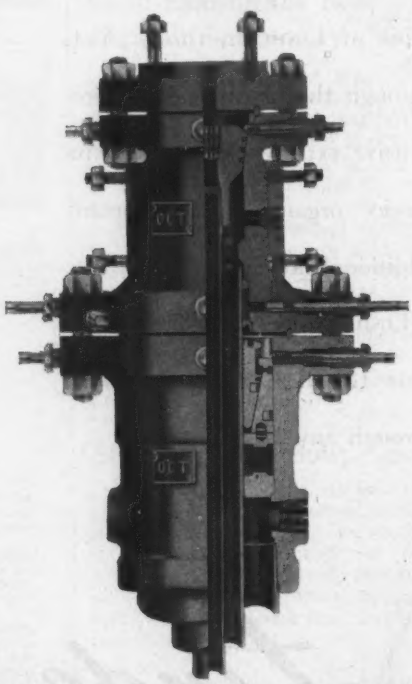


O-C-T TYPE "JE" FLOW CONTROL



This unit performs, in a single integral casting, all the functions of a Christmas tree cross or tee, wing valve, and adjustable or positive choke, and provides a top connection for bottom hole test adapter, flange or bull plug. The choke section may be easily converted from a positive to an adjustable type in the field. All "JE-1" Flow Controls are provided with upset female thread for handling tubing.

O-C-T TYPE "T-16-I" TUBING HEAD AND C-19 CASING HEAD



The T-16-I Tubing Head with lock-down screws may be fitted with any desired type hanger. Note that any additional casing seal is provided in the lower flange of this head, providing a pressure area restriction, ports for seal testing and reserve packing screws.

This O-C-T well head assembly, designed for high efficiency and safety on extremely deep and high pressure wells, offers the latest improvements in design. The Type C-19 Full Opening Casing Head provides a latch-around type, self-setting Hycar seal and slip suspension designed for high casing loads. The hanger may be latched around the pipe and dropped through the blowout preventer. It sets automatically upon reaching the head. Additional sealing compression may be applied by tightening packing compression screws.

Oil Center Tool Co.

PIPE LINES

Magnolia 20-In. More Than Third Completed

More than 238 miles of 20-in. had been laid for Magnolia Pipe Line Co.'s Corsicana, Tex.,-Patoka, Ill., crude-oil line by the beginning of this week. Last week all three gangs laid 18 miles.

In the 75 days following the commencement of the project June 2, Oklahoma Contracting Co. finished the entire 118 miles in the open country of Section 1, at the Corsicana end; this represents progress of more than 1½ miles per day. Of the 75-day construction period, 2 days were spent in moving; one day work had to stop on account of rain. Oklahoma Contracting Co. is now engaged in laying pipe for Section 6 at the Illinois end, for which field headquarters are maintained at Centralia, Ill., where Charles Ice is spread superintendent.

This contractor is also laying pipe for the Red River crossing.

H. C. Price Co. and Eastern Construction Co. are progressing in their sections. Both sections are heavily timbered. The section of H. C. Price Co. traverses rough hilly country.

The field headquarters of Magnolia Pipe Line Co. for this project under the direction of J. E. McGeath, assistant general superintendent, were moved this week from Texarkana to North Little Rock, Ark.; the address there is Post Office Box 290. George T. Jackson, superintendent of construction, spends much time on the 20-in project. Since he has a supervision over all of Magnolia Pipe Line Co.'s construction, he operates from the Dallas office where company operations are directed by Lester H. True, manager.

The 20-in. project is scheduled for completion in February 1948 because the rate of pipe deliveries will not permit faster construction. Progress is being made in the construction of pump-station foundations.

Magnolia Asks Approval For River Crossing

Magnolia Pipe Line Co. has requested permission from the War Department to construct, maintain and operate a 20-in. crude-oil pipe line across the Mississippi River 1 mile downstream from Chester, Ill.

These sections are a part of the $31,680,000 pipe line Magnolia plans to construct between Patoka, Ill., and Corsicana, Tex., through Conway, Little Rock, and Hot Springs, Ark.

Mid-Continent to Build Southern Oklahoma Lines

Plans for a $1,000,000 project to expand and modernize its pipe-line system in southern Oklahoma have been announced by Mid-Continent Pipe Line Co.

Principal project, to cost more than $750,000, will be the construction of a 50-mile, 6-in. crude line into the active development area of McClain and Garvin counties, extending from the company's main-line pump station in St. Louis, Okla., pool southwest through the Wayne, Maysville, Antioch, and Lindsay pool areas.

The crude line would be terminated in southwestern Oklahoma at a point where it might be extended to other active drilling areas. A 14-mile, 4-in. connecting line will be built from the new line into the Pauls Valley area.

Included in the program are plans for enlarging pump stations at Bad Creek and Drumright to enable them to handle the 7,500 bbl. initial capacity of the new line. The additional crude will be transported to the Tulsa refinery of Mid-Continent Petroleum Corp., which is now being enlarged and modernized.

Mid-Continent Pipe Line Co., second largest crude gatherer in Oklahoma, now operates 1,500 miles of pipe lines in the state. The company has just completed a 6-mile line extending from the Ramsey pool pump station to the Stillwater area and is completing a 5-mile extension into East Sporn pool near Cushing from the Ramsey discharge line.

Texas Pipe Line Prepares For New Projects

Texas Pipe Line Co. is preparing to start construction of the products system in September. This project will consist of 146 miles of 10-in. from Hearne, Tex., to Dallas, and 26 miles of 8 in. between Dallas and Fort Worth. At Hearne, the line will connect with Magnolia Pipe Line Co.'s products line now being built from Beaumont.

Pipe is expected to start arriving about September 15, according to R. B. McLaughlin, president, Texas Pipe Line Co. The contractor, Associated Contractors & Engineers, will start laying pipe as soon as it is received.

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The plan is to operate with one spread starting from Hearne to move north. Erection of tanks has been contracted by Chicago Bridge & Iron Co.

Texas Pipe Line Co. recently awarded contract to C. L. Rogers Construction Co. to lay 23 miles of 8-in. crude-oil line from Antioch pool to Velma in Garvin and Stephen counties, Oklahoma.

Developments within the last week make it necessary for Texas Pipe Line Co. to defer the letting of contracts for the West Texas-Cushing Okla., crude-oil line for 60 days. Previously it had been expected that contracts for this project involving 20, 22, and 24-in. might be let in September.

Texas Pipe Line Co. is considering a loop between Salem and Clay City, Ill., to eliminate a bottleneck for movements of crude from Salem via Clay City to Lawrenceville, Ill.

Texas Empire Studies Illinois Expansion Plans

Texas Empire Pipe Line Co. is conducting engineering studies to determine the feasibility of constructing a large-capacity pipe line for crude-oil service from Salem to Wilmington, Ill.

The present 10-in. and 8-in. lines running north to Heyworth, Ill., would not be adequate for handling the large volume which will reach the Salem area on completing of the Shell-Texas pipe-line project announced last week.

Magnolia Products Line Half Completed

Magnolia Pipe Line Co. had laid approximately 60 miles of 12-in. products line up to the beginning of this week in construction for its 118-mile system from the Beaumont, Tex., refinery area to Hearne, Tex., where it will join the 10-in. line to be built north by Texas Pipe Line Co. The Magnolia project, started June 10, is scheduled for completion January 1, 1948.

The contractor, Smith Contracting Co., is following a program for two spreads, one going south and the other north. It is expected that they will probably meet in the vicinity of Plantersville, Tex.

Preliminary Work Started On Jal-Cushing Crude Line

Preliminary ground work was under way early this week in the Jal, N. M., and Midland, Tex., areas preparatory to starting construction on the Jal-Cushing, Okla., 20 to 24-in. crude-oil line planned by Texas Pipe Line Co., Shell Pipe Line Corp., Em-

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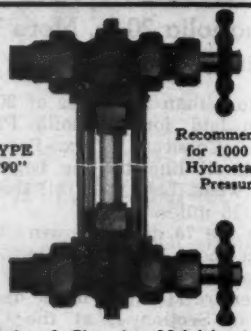

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Pipe Line Service offers you low-cost insurance for your underground lines through a complete pipe protection service that leaves nothing to chance. Six strategically located plants provide pipe cleaning, priming, coating and wrapping—furnishing all materials and equipment to avoid division of responsibility and to relieve you of all details on your pipe protection requirements.

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pire Pipe Line Co., and Sinclair Refining Co.

Essex Construction Co., Midland, has the contract to do the grading, and other earthwork in the Midland area. Contract for similar work in the Jal area is held by S. S. & R. Construction Co., Kermit, Tex.

Contract for construction of storage tanks with a capacity of 122,000 bbl. at Jal, Wink, and Midland, has been awarded Chicago Bridge & Iron Co. Steel now is being delivered and construction is to begin soon.

Pipe-line construction is scheduled to start in October. Specifications are to be issued early in September.

FPC Sets Date for Final Big Inch Hearing

ORAL argument on Texas Eastern Transmission Corp.'s application to acquire and operate the Big Inch and Little Big Inch pipe lines for the transmission of natural gas and to construct additions to the lines has been set for September 22 by the Federal Power Commission.

The oral argument was scheduled after the company declared "the due and timely execution of its functions imperatively and unavoidably requires" that FPC render the final decision immediately.

The argument will be held in the FPC Hearing Room, Washington, D. C.

The sale to Texas Eastern Transmission Corp., formed by E. Holley Poe, was announced by Administrator Robert M. Littlejohn February 14, when the company's bid of $143,127,000 for the Big Inch and Little Inch was tentatively accepted. At that time the lines were under an interim lease by Tennessee Gas & Transmission Co.

The Big and Little Inch were built and operated by the War Emergency Pipelines, Inc., headed by W. Alton Jones, president of Cities Service Oil Co. Chairman John D. Goodloe, of the Reconstruction Finance Corp., in a recent letter of commendation and appreciation to Jones, pointed out that the lines more than met expectations from both military and economic standpoints. The net return to the government was, he said, approximately $182,000,000, excluding depreciation, while government capital invested amounted to approximately $145,000,000, about the amount that the lines were sold for. The saving by the Government in oil transportation amounted to $290,000,000.

Goodloe was high in his praise of the efficiency of the operation of the line during wartime and attributed it to a very capable staff and outstanding ability of the executives of 11 oil companies which contributed without fee or profit to the organization and operation of War Emergency Pipelines, Inc.

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NATURAL GAS

Consolidated Told to Halt Industrial Sales

AN injunction suit to prevent Michigan Consolidated Gas Co. from selling natural gas to five Detroit industries has been filed by the Federal Power Commission in the United States District Court for eastern Michigan.

The suit also seeks to prevent Panhandle Eastern Pipeline Co. from selling gas to Consolidated for resale to the firms, including the Ford and Chrysler companies, Great Lakes Steel Corp., Briggs Manufacturing Co., and Solvay Process Co.

FPC said the sales were "contrary to the public interest" and said the natural gas should be stored "to meet the needs of residential and other customers in the winter months when a serious shortage of gas is threatened throughout the area served by the Panhandle system."

FPC urged "prompt action" to save the gas for winter distribution. The agency first ordered Consolidated to stop its industrial sales on August 10. Consolidated declined to comply, charging the order was issued without "due process." FPC said Panhandle was willing to stop the sales and that the company sought an injunction to prevent Consolidated's industrial sales at that time.

Steel Supply to Be Topic Of A.G.A. Convention Talk

A discussion of the supply of steel and its allocation by C. M. White, president of Republic Steel Corp., Cleveland, will be one of the highlights of the twenty-ninth annual convention of the American Gas Association, to be held October 6-8 in the Cleveland Auditorium.

R. H. Hargrove, president of the association and recently elected president of Texas Eastern Transmission Co., will preside at the convention.

Also prominent on the program will be talks by Nelson E. Smith, chairman of the Federal Power Commission, who will speak on the problem of natural gas industry regulation, and Max W. Ball, director of the Oil and Gas Division of the Department of the Interior, who will discuss activities of his division and conservation of natural resources.

Second day of the convention has been designated R. W. Gallagher Day, honoring the past chairman of the board of Standard Oil Co. of New Jersey, a past A.G.A. president and first chairman of the Laboratories Managing Committee.

J. French Robinson, president of East Ohio Gas Co. and a past president of the association, is chairman of the convention arrangements committee.

Natural Gas Sales Up For Year Just Ended

Natural-gas utility sales during June 1947 were 1,848,000,000 therms, an increase of 8.9 per cent over the same month of last year, when sales totaled 1,697,000,000 therms.

By volume, June sales of natural gas were 178,400,000 cu. ft., an increase of 9.5 per cent over the June 1946 figure of 162,900,000 cu. ft.

For the 12 months ended June 30, 1947, total natural gas sales were up from 22,303,000,000 therms to 24,429,000,000 therms or an increase from 2,144,000,000 cu. ft. to 2,353,000,000 cu. ft.

Total gas utility sales for June were 2,111,000,000 therms, an 8.7 per cent increase over sales of 1,942,000,000 therms for the same month last year.

Cities Service Gas Co. To Build New Pipe Line

Cities Service Gas Co. has been granted a temporary authorization by the Federal Power Commission to build a new pipe line from a point near Guthrie, Okla., on the company's Oklahoma City line, to its Drumright compressor station in Creek County, Okla.

The temporary authorization will allow the company to start construction on the project immediately. Preliminary estimates have placed the cost at $881,251.

$24,000,000 Gas Refund Approved by U. S. Court

A plan for refunding nearly $24,000,000 to natural-gas consumers in Kansas, Missouri, Oklahoma, and Nebraska was presented last week by James E. Smith, Topeka, special master, and approved by the Tenth U.S. Circuit Court of Appeals.

Forthy-three gas distributing companies serving 236 communities in the four states are involved in the refund, which became necessary when a new rate schedule went into effect last July 3 covering a period from September 1, 1943, to May 1, 1947.

Cities Service Gas Co. was unsuccessful in its attempt to amend the order relative to rates. The order was affirmed by the circuit court and a review was denied by the supreme court.

Tulsa Court Approves Sale of Gas Properties

Tulsa District Judge Horace D. Ballaine has denied the petition of the State of Oklahoma for an injunction to prevent Oklahoma Power & Water Co. from selling its natural-gas properties to Oklahoma Natural Gas Co.

The petition had been filed on the grounds that the sale of facilities of competing companies violated the state constitution.

Sale of the properties, valued at $850,000, earlier had been approved by the Securities and Exchange Commission. Oklahoma Power & Water contended the sale was proposed solely to meet requirements of the Federal Holding Company Act. (For earlier developments, see The Oil and Gas Journal for August 16, page 133, and August 23, page 138).

Research Report Released

Publication and release of a new research report on gum, dust, and rust filtering for the protection of pilots and controls from stoppages is announced by the American Gas Association. Sponsored by the committee on domestic gas research, this project was conducted by Arthur D. Little, Inc., Cambridge, Mass. It includes a review of pertinent literature, results of field studies, and a complete discussion on the performance characteristics of filter materials.

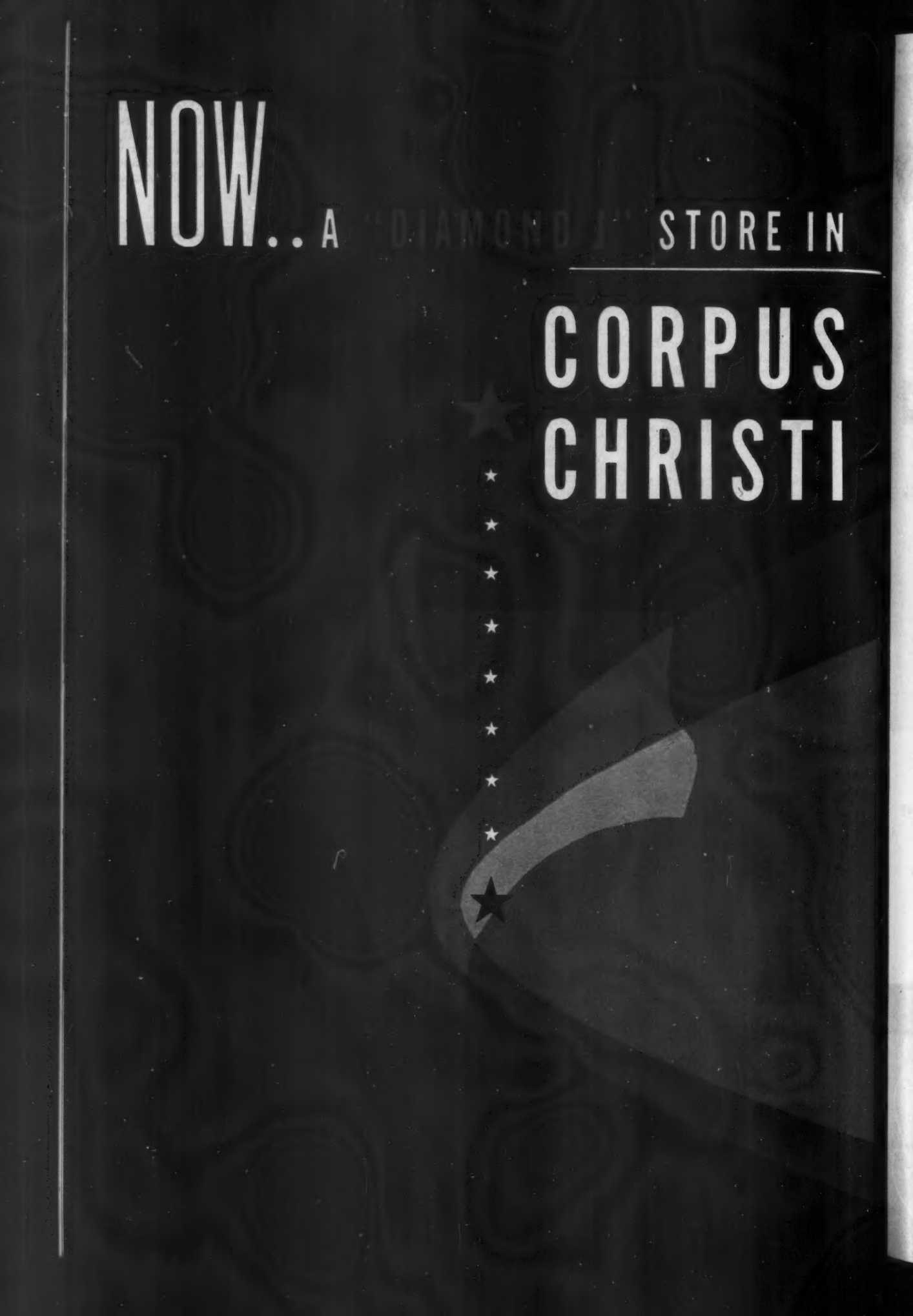
Natural Gasoline

Natural Gasoline Output Shows Increase in June

Increases in June in the daily average production of natural gasoline and allied products occurred in all districts except Oklahoma, Inland Louisiana, Texas Gulf, and Montana.

The daily average production of natural gasoline and allied products increased to 14,637,000 gal., compared to 14,013,000 gal. in May and 13,091,000 gal. in June 1946.

A net decrease of stocks during the month of 4,764,000 gal. was caused by the increase of stocks at refineries and the decrease at plants and terminals. The total of 228,992,000 gal. was 79,393,000 gal. less than was reported on June 30, 1946.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Exploration and Drilling

Another California Reservoir

PROBABILITY of a new-zone discovery at Sunray Oil Corp. 2 Los Flores, confirmation test to Sunray's recent discovery in the Orcutt area of Santa Barbara County, definitely indicates that the new area may develop into one of the most important reservoirs uncovered during the current year in California.

During a recent formation test of 2 Los Flores, 4-8n-33w, the well produced at the rate of 200 bbl. of 32°-gravity crude per day from a depth of 4.390-4,500 ft. A later test made at the interval 4,450-4,500 ft., was open for 1 hour and resulted in the recovery of gas at the surface in 10 minutes and another flow of oil estimated to be at the rate of 200 bbl. per day. Both of the intervals tested are in the Miocene-Pliocene contact, a new zone for the area. This particular zone was productive for several years in nearby Orcutt field but reached a depletion stage there a few years ago.

The new area, located approximately 1½ miles southeast of Orcutt (Santa Maria) field, was opened 2 months ago by Sunray 1 Los Flores, which was completed in the Miocene sand at a depth of 4,805-30 ft. for an initial production of 540 bbl. of 31°-gravity oil daily through a ½-in. choke. This well currently is producing at the rate of 175 bbl. daily through a 13/64-in. choke. The discovery was significant in that it provided a new reservoir of high-gravity crude in an area where formerly only the heavy Santa Maria crude had been available.

Four Possible Pay Zones

The new field, an asymetric anticlinal-type structure, contains four possible producing zones. In addition to the Miocene sand which is producing in the first well, and the Miocene-Pliocene contact zone just tested in the second well, a chert zone lying approximately 500 ft. below the Miocene sand was also found to contain oil during the course of drilling at 1 Los Flores. It was not conclusively tested, however, and 2 Los Flores will be carried on down to determine the potentialities of this zone.

The fourth possible zone is a shallow sand lying well above the other three zones. This sand was not tested in either of the first two wells, but Sunray is now drilling at 733 ft. at 1A Los Flores, a shallow test in the same section which will make conclusive tests of the possibilities of production from the shallow sand.

One peculiar fact uncovered by the two wells which have been drilled to date is that two different types of oil are found on the structure. The Miocene sand zone, which lies between the Miocene-Pliocene contact zone and the chert zone, produces a paraffin-base oil while both the contact and chert zones produce an asphalt-base oil. No satisfactory explanation of this phenomenon has yet been advanced.

Areal extent of the new field has not yet been estimated, but it is probable that it will not be extremely large. Should the four zones known to contain oil all prove to be commercially productive, however, it is quite probable that Sunray has added a significant reserve to California's dwindling crude supply.

APPALACHIAN FIELD

Casing Run to Shut Off Water in Wildcat

PITTSBURGH.—In Summit Township, Erie County, Pennsylvania, Appalachian Development Corp. ran casing to bottom, 2,440 ft., in the wildcat on Chester F. Fuhrman farm to shut off the Oriskany water before drilling down to the Silurian. The Oriskany was logged at 2,325-40 ft. with a show of gas and salt water at 2,337 ft.

Only two new tests were listed in southwest Pennsylvania during the week and they are in Burrell and Parks townships, Armstrong County.

SOUTHWEST PENNSYLVANIA SUCCESSFUL WILDCAT

Washington County, Fallowfield Township: Myers & Campbell 1 Sam and Monty Redd, 1,303,000 cu. ft. gas; Gantz sand 2,122-55 ft., gas 2,125 ft., Fifty Foot sand 2,181-2,252 ft., gas 2,228 ft., TD 2,252 ft.

WEST VIRGINIA SUCCESSFUL WILDCATS

Jackson County, Ripley district: Godfrey L. Cabot, Inc. 1,235 Lucy Boswell, 569,000 cu. ft. gas after 60-qt. shot, elevation 713 ft., Corniferous lime 4,820 ft., Oriskanq 4,921-81 ft., chert 4,981-84 ft., gas 4,932-34 ft., TD 4,984 ft.

Raleigh County, Clear Fork district: United Fuel Gas Co. 5,812 Coal River M. & L. Co., 793,000 cu. ft. gas, Weir sand, total depth 3,514 ft.

WEST VIRGINIA WILDCAT FAILURE

Fayette County, Fayetteville district: Columbian Carbon Co. 951 Coal Run Land Co., dry, Big lime 2,213-2,555 ft., TD 3,150 ft.

EASTERN TEXAS

Grayson County Test Gets Further Shows of Oil

DALLAS.—Further shows of oil were indicated at Standard Oil Co. of Texas 1 Covey, shallow wildcat 2 miles north of Sherman in Grayson County. Cores from 3,739-46 ft. recovered 7 ft. of oil sand, and a 1-hour drill-stem test of the interval recovered 124 ft. of oil and gas-cut drilling mud. Bottom-hole pressure rose to 1,350 lb. in 20 minutes. Further coring to 3,756 ft. recovered 2 ft. of oil-aturated sand; no shows between 3,778-81 ft., but additional oil sand at 3,781-89 ft. A 1-hour drill-stem test between 3,778-89 ft. brought gas to the surface in 7 minutes and recovered 1,330 ft. of dark, gas-cut oil, and 732 ft. of slightly muddy and gas-cut oil. Bottom-hole pressure increased to 1,500 lb. in 20 minutes. The oil was said to be slightly above 40° gravity. Operators were to set casing before making production tests.

Prospects of the first oil production in Red River County were reported from M. S. Slagel 1 Southern Pine Lumber Co. wildcat, 16 miles northeast of Clarksville, and in the D. D. Bruton Survey. Cores between 2,122-27 ft. were said to have recovered 7 ft. of saturated sand, with good porosity. No tests were made, but electric survey was run and casing was to be set. Elevation of the well is 435 ft., and opinion was that the prospective pay formation is the Travis Peak.

A new distillate pay zone in the Travis Peak at Chapel Hill field of Smith County was found at Chapel Hill Gas System 1 Rayford. Through perforations at 8,100-56 ft., the well flowed 7 bbl. of 54.6°-gravity distillate, through 3/16-in. choke and with a gas-oil ratio of 20,294 to 1. A second 6-hour test at 8,166-8,308 ft. produced 41 bbl. of 58.7°-gravity distillate, at a ratio of 4,069 to 1. Operators were to make additional perforations. Regular pay zones for the field are the Paluxy and Glen Rose sections of the lower Cretaceous.

EAST TEXAS WILDCAT FAILURES

Hopkins County: T. G. Shaww 1 Hattie Lee and W. B. Thomas, John Blocker Sur., 5 mi. S Cumby, dry, TD 5,862 ft., sample tops: Pecan 3,055 ft., Austin 3½239-3,340 ft., Georgetown 4,850 ft., Paluxy with salt water 5,652 ft., elevation 565 ft.

Milam County: W. F. Glenn 1 Sulka, Jose Leal Sur., 4½ mi. NE Rockdale, dry, TD 740 ft.

Shelby County: L. E. Winslow 1 Lilly, C. C. Tutt Sur., 3 mi. SE Shelbyville, dry, TD 4,020 ft., sample tops: Navarro 2,381 ft., Saratoga 2,410 ft., lower Taylor shale 3,340 ft.

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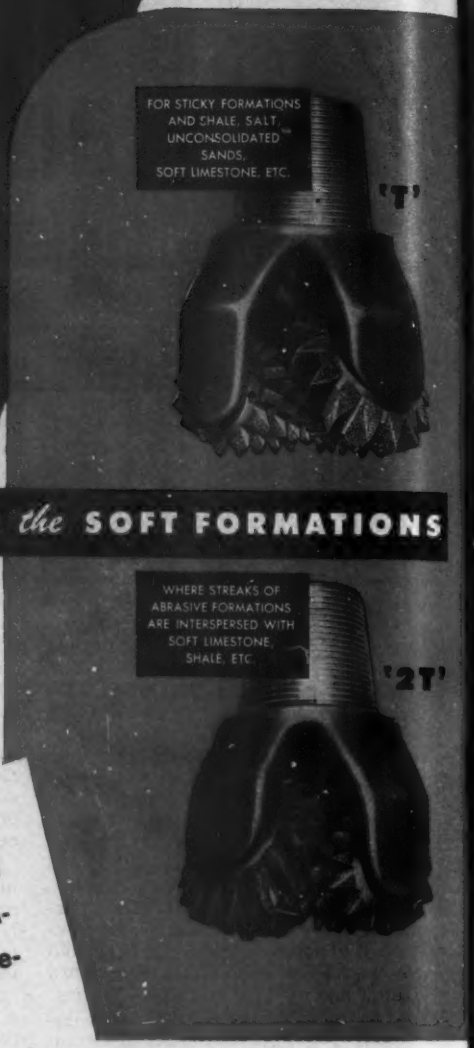
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SOUTH LOUISIANA

New Pool Opened In Beauregard Parish

NEW ORLEANS.—A new oil pool for Beauregard Parish, 3 miles east of Perkins field, has been opened by The Union Sulphur Co., Inc. 1 W. E. McFatter, 34-7s-10w. Drilled to a total depth of 7,501 ft., this well flowed an initial production of 130 bbl. of oil per day through a 7/64-in. choke, gas-oil ratio 1,322, tubing pressure 1,600 psi., and gravity 29.5°. Production is through perforations at 6,498-6,506 ft.

Amerada Petroleum Corp. 13 C. E. Gheens, 37-15s-20e, opened a new oil sand for Des Allemands pool, in Lafourche Parish. Top of sand 8,408 ft., and perforations at 8,408-12 ft. On potential test it flowed 195 bbl. of oil per day through a ¼-in. choke with gas-oil ratio of 512. Tubing pressure was 1,250 psi., and gravity 33°. Total depth of the hole is 8,897 ft.

A new gas-condensate sand for West Cote Blanche Bay pool has been opened by The Texas Co. 27 State-West Cote Blanche Bay, Lease 340, Township 15s-6e, St. Mary Parish. Total depth is 11,117 ft., with perforations at 10,916-69 ft. On potential test it flowed 33 bbl. of condensate per day and 3,240,000 cu. ft. gas per day through ¼-in. choke, gas-condensate ratio 100,000, tubing pressure 2,200 psi. Shutin pressure 4,500 psi., and gravity of oil 55°, with no water in the flow.

Magnolia Petroleum Co. 1 Vincent Estate, 18-14s-10w, in Northwest Mud Lake producing area of Cameron Parish, has confirmed production and also opened a new shallower sand to gas-condensate production. Well flowed gas and condensate with 4,000 psi. pressure through a ⅛-in. choke from two sets of perforations with a total of 408 holes from 9,539-51 ft. and 9,957-10,047 ft. No potential gage has been made. Total depth is 10,950 ft., and producing sands are in a broken section from 9,937-10,085 ft.

Shell Oil Co., Inc. 1 Weeks Island, State Unit "A," opened a new sand at Week's Island pool, Iberia Parish. Top of sand 12,911 ft., with perforations at 12,911-17 ft., this well flowed a potential of 434 bbl. of oil per day through an 11/64-in. choke, with gas-oil ratio of 1,189. Tubing pressure 2,575 psi., gravity 33°, with no water in the flow. Total depth is 13,000 ft.

SOUTH LOUISIANA SUCCESSFUL WILDCATS

Beauregard Parish: New oil pool—Union Sulphur 1 W. E. McFatter, 34-7s-10w, 3 mi. E of Perkins field in Calcasieu Parish, TD 7,501 ft., top sand 6,498 ft., perf. 6,498-6,506 ft. IP: 130 bbl. oil per day through a 7/64-in. choke, gas-oil ratio 1,322, TP 1,600 psi., gravity 29.5°, no water.

Iberia Parish: New oil sand, Weeks Island pool—Shell 1 Weeks Island, State Unit "A," 13-14s-6e, TD 13,000 ft., top sand 12,911 ft., perf. 12,911-17 ft., and 12,924-34 ft., IP: 434 bbl. oil per day through an 11/64-in. choke, gas-oil ratio 1,189, TP 2,575 psi., gravity 33°, no water.

Lafourche Parish: New oil sand, Des Allemands pool—Amerada 13 C. E. Gheens, 37-15s-20e, TD 8,897 ft., top sand 8,408 ft., perf. 8,408-12 ft., IP: 195 bbl. oil per day through a ¼-in. choke, gas-oil ratio 512, TP 1,250 psi., gravity 33°, no water.

St. Mary Parish: New gas-condensate sand, West Cote Blanche Bay—Texas Co. 27 State-West Cote Blanche Bay, Lease 340, Twp. 15s-6e, TD 11,117 ft., perf. 10,916-69 ft., IP: 33 bbl. condensate per day and 3,240,000 cu. ft. gas per day through a ¼-in. choke, gas-condensate ratio 100,000, TP 2,200 psi., SIP 4,500 psi., gravity 55°, no water.

SOUTH LOUISIANA WILDCAT FAILURES

Beauregard Parish: Sinclair Prairie 1 Long Bell, 5-3s-8w, 4 mi. E of DeRidder townsite, 13 mi. E of production in Neale field, dry, TD 8,970 ft.

Lafourche Parish: Stanolind 1 State, Lease 739, in Timbalier Bay, Twp. 23s-20e, TD 13,129 ft., dry.

Plaquemines Parish: S. W. Richardson 2-B Delacroix Corp., 4-16s-13e, 7 mi. W of Delacroix field production, dry, TD 11,286 ft.

MICHIGAN

Kimball Lake Gets Six More Producing Wells

SAGINAW.—As the Newaygo County Kimball Lake oil field development continued with six more heavy producers completed in the past week, the State Conservation Department made permanent its temporary order cutting the daily withdrawal per well by 25 per cent to 75 bbl. The six new producers had combined initial potential of 10,600 bbl. a day, one coming in at 230 bbl. per hour.

Completions in Michigan for the week totaled 22, including 8 oil wells, 3 gas wells and 11 dry holes. Eight of the failures were wildcat operations, three of them in Allegan County. Aside from the Newaygo wells, other producers included a 200-bbl. well in Bay County and a 14-bbl. well in Tuscola County. The gas wells are in Mecosta's Austin field.

Twenty-three new locations were announced, nine of them in the Kimball Lake areas, three in Clare, two in Arenac and one each in the counties of Montcalm, Ottawa, Barry, Lake, Missaukee, Mecosta, Roscommon, Muskegon, and Osceola.

Two other proration orders by P. J. Hoffmaster, state supervisor of wells, reflected

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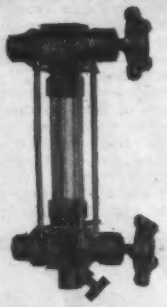

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dwindling operations in two of the bigger fields in Michigan. On advice of the state oil advisory board, proration was lifted in Osceola County's Reed City field and in the Fork pool of Missaukee County.

MICHIGAN WILDCAT FAILURES

Allegan County, Allegan Township: Wadsworth & Cook 1 Allegan County, NW SW NE 5-2n-13w, dry in Traverse limestone, TD 1,533 ft.

Heath Township: Leonard C. Sleep 1 Charles A. Thompson, SW NW SE 36-3n-14w, dry in Traverse limestone, TD 1,534 ft.

Monterey Township: Lloyd C. Green 1 Fred Brussow, NW NW NE 29-3n-13w, dry in Traverse limestone, TD 1,780 ft.

Barry County, Yankee Springs Township: Louis Zellman 1 S. and B. Bowen, NE NE SW 6-3n-10w, dry in Monroe, TD 2,166 ft.

Clare County, Hatton Township: Sohio Petroleum Co.-Lupher Drilling Co. 1 J. D. McKay, SE NW SW 33-8n-4w, dry in Marshall, TD 1,805 ft.

Kent County, Sparta Township: Clarence Crawford 1 John W. McCready, SW NW SE 26-9n-12w, dry in Detroit River, TD 2,684 ft.

Oceana County, Claybanks Township: Neil Wagenauer 1 G. T. Fulljames and Federal Mortgage Corp., NE SE SW 12-13n-18w, dry in Traverse limestone, TD 1,725 ft.

Washtenaw County, Salem Township: Homer L. Heath, Agent, 1 Merritt, Wilson & Buers, NW SE SW 1-1s-7e, dry hole, TD 3,220 ft.

TEXAS GULF COAST

New Gas Pool Opened In Wharton County

HOUSTON.—Quintana Petroleum Corp. et al 1 L. J. Foerster, new gas-condensate field discovery in Calhoun County, approximately 2 miles northeast of Sheriff field and 3 miles west of Port Lavaca field, was gaged at 7,910,000 cu. ft. of gas per day on open flow, with shutin pressure of 3,015 psi., on official potential gage through perforations at 7,920-41 ft. The well made gas and condensate at a rate of 4,090,000 cu. ft. of gas through a ¼-in. choke, with 2,635 psi. working pressure, no water in the flow. This well is located in Y. Benavides Survey. Total depth is 10,064 ft. Operators now have moved over onto their 1-A L. J. Foerster, about ½ mile northwest of the 1 Foerster discovery, in Menan Mills Survey.

In the Louise area of Wharton County, Jack W. Frazier 1 Fred Swenson, in James Devers Survey, has opened a new gas pool. This well was originally drilled by W. S. Boyle in 1944 and completed as dry with a total depth of 6,012 ft. Frazier reworked and drilled out to depth of 5,500 ft. and completed for a gas well through perforations at 4,803-11 ft. for a potential gage of 2,660,000 cu. ft. of gas per day through a ¼-in. choke with a calculated open flow of 16,700,000 cu. ft. per day. Flowing pressure on the tubing is 1,510 psi. and shutin pressure 1,985 psi.

Sabine Tram field, Newton County, has been extended eastward ¼ mile by Humble Oil & Refining Co. 4 E. C. Hankamer, in Evans Shoemaker Survey. Drilled to a total depth of 8,053 ft. this well flowed an initial production gage of 165 bbl. of 39°-gravity oil daily through a ⅛-in. choke with 1,390 psi. flowing pressure on the tubing and a gas ratio of 627. No water was in the flow. Production is through perforations at 7,986-90 ft.

New producing sand for Englehart discovery area of Colorado County has been opened by Shell Oil Co., Inc., and Tide Water Associated Oil Co. 1 J. H. Hudson in the S. Kennelly Survey, 6,400 ft. southwest of Shell's 1 Kyle discovery well. Total depth is 11,802 ft. and on potential gage flowed 80 bbl. of 53.6°-gravity condensate daily along with 2,177,000 cu. ft. of gas per day through a ¼-in. choke, gas-condensate ratio 27,300. Along with the flow was 6.77 bbl. of fresh water per day. Open-flow calculation was 3,700,000 cu. ft. per day. Flowing pressure on tubing was 1,870 psi., casing pressure 1,992 psi. and shut-in pressure 3,149 psi.

Tide Water Associated 1 J. D. Hudgins, discovery well of West Bernard field in Wharton County, Between Lissie and Egypt fields, in GH&H Survey, gaged 40 bbl. of condensate per day along with 2,860,000 cu. ft. of gas with a ratio of 72,000. Flowing pressure on the tubing was 1,210 psi. and 1,340 psi. on the casing with a shut-in pressure of 2,510 psi. Fluid is 57.7°-gravity condensate and open flow calculation is 9,100,000 cu. ft. of gas per day. Production is through perforations at 6,708-12 ft. and 6,720-6,723 ft. Total depth is 7,901 ft.

Dan Auld 1 Henrich, new gas-condensate discovery well in Goliad County, near the DeWitt County line, gaged 3,200,000 cu. ft. of gas per day through perforations at 7,560-66 ft. in the Slick sand, top of sand 7,556 ft. Total depth is 7,774 ft., with 5½-in. casting set to 7,770 ft. This well is located in Cyrus Donnelly Survey, 3 miles northwest of Weesache.

TEXAS GULF COAST SUCCESSFUL WILDCATS

Bee County: Extension to Yoward pool—Mills Bennett and Anderson & Prichard 1 W. Sherwood, in H. Coley Sur., 1 mi. NW of Mineral field and 1 mi. N-NE of Yoward field discovery, TD 7,653 ft., top sand 7,485 ft. (Slick sand), perf. 7,507-10 ft., IP: 44 bbl. oil per day through ¼-in. choke, gas-oil ratio 4,730, TP 410 psi., CP 800 psi., gravity 45°, no water.

Calhoun County: New oil pool—Green Lake field—Ryan Consolidated 1 Theresa H. Wagner, in Manual Lopez Grant, 2 mi. E-NE of Green Lake townsite, TD 6,097 ft., top sand 5,977 ft., perf. 5,980-6,008 ft., IP: 33 bbl. oil per day through a ⅛-in. choke, by heads, gas-oil ratio very low, TP 450 psi., casing sealed, gravity 40.6°, no water.

Colorado County: New gas-condensate sand Englehart discovery area—Shell et al 1 J. H. Hudson, in S. Kennelly Sur., TD 11,802 ft., top sand 8,882 ft., perf. 8,882-90 ft., and 8,928-34 ft., and 8,948-87 ft., IP: 80 bbl. condensate per day and 2,177,000 cu. ft. gas per day through a ¼-in. choke, gas-condensate ratio 27,300, open flow calculation, 3,700,000 cu. ft. gas per day, TP 1,870 psi., CP 1,992 psi. gravity 53.6°, SIP 3,149 psi., and 6.77 bbl. fresh water.

Live Oak County: New condensate pool—Continental Oil Co. 1 Kittie West Burns, in G. L. Haas Sur., 7 mi. SW of George West, 2 mi. NE of Clay West field, TD 10,338 ft., top sand 10,170 ft., perf. 10,236-248 ft., and 10,170-190 ft., IP: 1,970,000 cu. ft. gas per day and 2 bbl. condensate through a ⅛-in. choke, 19 hours, WP 4,700 psi., no water.

Matagorda County: New oil sand, Sugar Valley field—Humble 1 Truitt & Gravier et al, in Freeman George Sur., 1 mi. SE of production, TD 11,486 ft., perf. 9,970 ft., IP: 199 bbl. oil per day through ¼-in. choke, gas-oil ratio 596, TP 390 psi., gravity 28.4°, 0.5 per cent water.

Refugio County: New condensate pay, North La Rosa field—Phillips 1 S. Bill, Johnson & Pugh Subd. of Bonnie View Ranch, rework job, originally completed for gas-condensate well through perforations 6,156-72 ft., went to salt water, TD 9,203 ft., top new sand 5,633 ft., perf. 5,633-42 ft., IP: 1,616,000 cu. ft. gas and 75 bbl. condensate per day through 3/16-in. choke, TP 2,100 psi., SIP 2,150 psi., no water.

Wharton County: New gas pool—Jack Frazier 1 Fred Swenson, in Jas. Devers Sur., 2 mi. SW of Louise townsite (an old abandoned hole drilled by W. S. Boyle in 1944, OTD 6,012 ft.) Operators reworked and drilled out to new TD 5,500 ft., top sand 4,803 ft., perf. 4,803-11 ft., IP: 2,660,000 cu. ft. gas per day

through ¼-in. choke, TP 1,910 psi., SIP 1,985 psi., dry gas, no water.

New gas-condensate pool, West Bernard—Tide Water Associated 1 J. D. Hudgins, in GH&H Sur., Block 39, 5 mi. SE of nearest production at Lissie and equidistant NE of Egypt gas production, TD 7,901 ft., perf. 6,708-12 ft., and 6,720-23 ft., IP: 40 bbl. condensate per day and 2,860,000 cu. ft. gas per day through a ¼-in. choke, gas-condensate ratio 72,000, TP 1,210 psi., CP 1,340 psi., SIP 2,510 psi., gravity 57.7°, no water.

TEXAS GULF COAST WILDCAT FAILURES

Calhoun County: The Texas Co. 1 State Tract 107, in Matagorda Bay, dry, TD 5,705 ft.

Jackson County: Monday Oil Co. et al 1 Henry P. Hill, in S. C. A. Rogers 1 League, 2 mi. N-NW of Ganado, dry, TD 6,000 ft.

Live Oak County: Humble 1 J. W. Patterson, in Jas. Latham Sur. 5, 14 mi. S SW of Geo. West, dry, TD 5,020 ft.

L. M. Lockhart 1 Josephine Peck, in Maria Bridget Kivlin Grant, ½ mi. N of Mt. Lucas field, dry, TD 5,403 ft.

H. R. Smith and Gulf Oil Corp. 1 J. M. Ponder, in W. H. Rogers Sur. 243, 1 mi. S of Peggy and 4 mi. S SW of Fashing, dry, TD 4,400 ft.

Newton County: Hinkle Drlg. Co. 1 White & West, in Robert Goodwin League in South Call area, dry, TD 8,365 ft.

FLORIDA WILDCAT FAILURE

Okaloosa County: R. T. Adams 1 B. H. Hart, Jr., C NE NE 5-4n-22w, dry, TD 5,505 ft. Top chalk 2,815 ft., Eutaw 4,065 ft.

PERMIAN BASIN

Pure Gets Ellenburger Production at Dollar Hide

MIDLAND.—Pure Oil Co. 1 E. W. Cowden found prolific Ellenburger production in the Dollar Hide (Devonian) field of southwest Andrews County and operators estimated the discovery good for 50-75 bbl. of oil an hour. Top on the Ellenburger was reported at 9,990 ft., drilled out to 10,033 ft. A drill-stem test at 9,980-10,033 ft., using ⅝-in. chokes top and bottom, and 2,500 ft. of water ballast, cleaned the water cushion out and started making gas in 35 minutes; oil and gas flowed in 50 minutes, and clean oil at the end of 55 minutes. The tool was closed at the end of 80 minutes and the flow of oil was estimated since storage tanks were not up. The oil tested 42.7° gravity.

Nearest Ellenburger production is in the Keystone area, some 12 miles to the south, in north central Winkler County. The 1 E. W. Cowden had indicated commercial production from the field's regular pay zone, the Devonian around 7,700 ft., as well as the Wichita Albany at 6,600 ft., and the Silurian at 8,500 ft.

Gulf Oil Corp. 430-E. Goldsmith, first Ellenburger producer in Goldsmith field of Ector County, was completed flowing 301 bbl. of 46.8°-gravity oil a day through 1/16-in. choke, from perforations in casing at 9,495-9,535 ft. Top of the Ellenburger was 9,495 ft.

New Ellenburger production in the TXL field was reported at Phillips Petroleum Co. 1 Zetta, Section 28, Block 45, T&P Survey, which rated a daily flowing potential of 264.9 bbl. of 42.9°-gravity oil daily through ½-in. choke. Pay section between 9,590-9,765 ft. was acidized. Location of the well is in the southeast portion of the field. Phillips 1-P TXL, Section 29, Block 45, an outpost test 1¼ miles north of the field, was last reported drilling below 7,900 ft.

WEST TEXAS WILDCAT FAILURES

Concho County: Southern Minerals, Inc. 1 A. R. Henderson, Sec. 63, Blk. 8, H&TC Sur., 3 mi. SW Ruth, dry, TD 4,093 ft., Strawn 3,335 ft., Ellenburger 4,050 ft., elevation 2,326 ft., DST 3,338-49 ft., recovered dead oil, DST 3,348-59 ft., recovered asphaltic oil.

Floyd County: Humble Oil & Refining Co. 1 Marcia Meriwether, Sec. 31, Blk. D-3, ELRR Sur., 12 mi. NE Floydada, dry, TD 7,745 ft., top black shale 5,920 ft., limestone 7,480 ft.

Lubbock County: Stanolind Oil & Gas Co. 1 G. G. Flinn, Sec. 10, Blk. D, LS&V Sur., 4 mi. NW Monroe, dry, TD 8,500 ft., San Andres 3,180 ft., Glorietta 4,560 ft., Tubb 5,850 ft., Wolfcamp 8,230 ft.

SOUTHEASTERN NEW MEXICO

HOBBS.—Continental Oil Co.'s pre-Cambrian test in Chaves County, the 1 Royce Lankford, 2-14s-26e, northeast of Hagerman, was coring ahead below 5,685 ft. after a drill-stem test at 5,120-5,246 ft. recovered only drilling mud. The section between 5,126-5,245 ft. had made a show of gas while drilling. Nine miles north of Robinson field, E. A. Hanson et al 1 Aston & Fair, 15-15s-31e, had total depth at 1,635 ft. and were waiting on cement after running casing. Richfield Oil Co. (previously Honolulu, Yates et al), 1 Mullis, 21-15s-29e, was coring below 12,142 ft. in the Ellenburger. A drill-stem test at 11,899-965 ft., open 15 minutes, produced a slight blow of air and recovered drilling mud.

In Lea County, Amerada Petroleum Corp. 5 Phillips, 1-20s-36e, deep test to the Ellenburger in the Monument area, was drilling ahead below 7,092 ft. in limestone. Mid-Continent Petroleum Corp. 2 Reeves, 29-20s-37e, 6,800-ft. rotary test 5 miles south of the Monument field, was drilling below 6,562 ft. Top of the Yates was 2,680 ft. R. Olsen et al Wimberly, 23-25s-37e, Ellenburger test 3½ miles east of Jal, took a drill-stem test between 4,700-4,871 ft. Open 35 minutes, it put gas to the surface in 4 minutes and recovered 180 ft. of gas and distillate-cut mud. Bottom-hole pressure was 1,000 lb., increasing to 2,000 lb. when shut in. Formation tops were the San Andres 3,620 ft., and the Glorietta 4,620 ft. Operators were drilling ahead.

MISSISSIPPI

Gas-Condensate Producer For Soso Field

JACKSON.—Union Producing Co. 1 Massey Unit, 28-10n-13w, in Soso field of Jasper County, has been completed as a gas-condensate producer from the upper portion of the Christmas sand. Based on a series of flow tests the well was given a calculated open-flow potential of 31,000,000 cu. ft. of gas per day. No gage was made of condensate. Production is through perforations at 6,664½-6,669½ ft. Top of Stanley sand 6,467 ft., and top of Christmas sand 6,661 ft.

The first operation on the Jones County side of Soso field, Gulf Refining Co. 1 W. W. Jackson et al, 26-10n-13w, encountered only one 4-ft. streak of sand having good porosity above the water level in the upper portion of the Christmas sand zone. Tubing is being run for completion tests through perforations at 6,667-76 ft.

In Jones County, Gulf 1 L. L. Majors, 29-6n-11w, wildcat test, is preparing to set 5½-in. casing at total depth of 13,157 ft. after recovering salt in last core at 13,150-13,157 ft. Cored tight sand with oil shows from 13,136-138 ft., and tight shaly sand and sandy shale with oil shows from 13,151-152 ft.

Humble Oil & Refining Co. 8 E. A. Ball, 20-2n-14e, in Hub field, Marion County, ran Schlumburger log at total depth of 10,122 ft., and set casing at 10,118 ft. to test Comanche gas-condensate sands. Gas-condensate sands were cored at 9,965-68 ft., 9,990-41 ft., 10,035-48 ft., 10,049-053 ft., and tight shaly sand 10,062-077 ft. Operators are preparing to run production tests.

N. CENTRAL TEXAS

Continued Expansion Seen For Parrot Field

WICHITA FALLS.—Development of Parrot field of southern Throckmorton County has been rapid, and new outposts are showing promises of a continued expansion. New locations for the field include Fred M. Manning 2 Marshall, Block 949, TE&L Survey, on the western edge of production, which will get under way immediately. On the northwest side of the field, Manning has farmed out the northeast quarter of Block 960 to S. D. Johnson et al, who have staked the 1 B. F. Askew, and will test the Caddo to 4,800 ft. South of the 1 Askew, Potts & Craig 1 Whitaker topped the Caddo limestone at 3,964 ft., with saturation to 3,576 ft., and was setting casing to test.

Eight miles north of Archer City, in Archer County, Southern Petroleum Exploration Co. 1 Wilson, Section 1, Block 71, ATNCL Survey, was setting casing to make production tests of an oil sand drilled from 3,864-76 and 3,886-3,903 ft. Further oil shows in sand and shale were found at 3,903-09 ft., total depth. A drill-stem test in the sand at 3,857-64 ft. recovered 35 ft. of oil-cut mud in 45 minutes, while a test at 3,650-60 ft. recovered only mud.

A new wildcat for Archer County was staked by B. F. Gilchrist Drilling Co. at its 1 Coleman. It will be an 1,800-ft. rotary test, in Block 25, Brazos County School Lands, some 4 miles northwest of Scotland.

Ohio Oil Co. has staked location for its 2 S. B. Burnett, which will be a 5,600-ft. rotary exploration in Section 2, Block 2, S. Lazarus Survey, King County. The new location is 2½ miles southeast of the same company's 1 Burnett, recent wildcat discovery which was completed in limestone at 5,230-52 ft. for a flowing potential of 20 bbl. of oil an hour.

NORTH CENTRAL TEXAS WILDCAT FAILURES

Archer County: Cochran & Cain 1 C. C. Prideau, A. McMullen Sur., A-287, 7 mi. N Farmer, dry, TD 815 ft., Gunsight 717-23 ft.

R. C. Dublin et al 1 J. H. Turbeville, Blk. 29, Jefferson School Land, 2½ mi. E Anarene, dry, TD 1,146 ft. in shale and sand, Gunsight 1,027-29 ft.

Baylor County: S. D. Johnson 1 Bege Tankersley, Sec. 77, BBB&C Sur., 5 mi. W Seymour, dry, TD 5,656 ft., Ellenburger 5,628 ft., no shows reported.

Montague County: D. H. Bolin 1 S. E. Howard "B," C. F. Leverett Sur., A-432, 1½ mi. SE Spanish Fort, dry, TD 3,422 ft.

Wichita County: Ted A. Norwood 2 W. B. Honaker "B," R. Mead Sur., 6 mi. NE Electra, dry, TD 1,905 ft., sand with show of oil 723-34 ft.

W. F. Palmer 1 Goetze Bros., Sec. 2, BS&F Sur., 3 mi. W Clara, dry, TD 2,145 ft., sand with odor 1,510-13 ft., sand with show of oil 1,782-87 ft.

Wilbarger County: Paradise Oil Co. 2 W. T. Waggoner "J," Sec. 37, Blk. 14, H&TC Sur., 10 mi. S Vernon, dry, TD 2,020 ft. in shale.

WEST CENTRAL TEXAS WILDCAT FAILURES

Brown County: W. L. Cox 1 J. H. Sanderson, Sec. 13, HT&B Sur., 4 mi. NE Bangs, dry, TD 993 ft., sand with water 943-58 ft.

Callahan County: Bailey & Stebinger Trust 2 Kennard, Sec. 10, ETRR Sur., 8 mi. NE Clyde, dry, TD 2,035 ft., sand with slight show of oil 1,641-43 ft. and 1,677-89 ft.

Jones County: John P. Byram 1 Alexander Trust, Sec. 2, Blk. 14, T&P Sur., 4 mi. E Nugent, dry, TD 1,883 ft., Bluff Creek sand with show of oil 1,587-90 ft., King sand, with water, 1,878-83 ft.

Stephens County: G. E. Kadane & Sons 1

Cochran, Sec. 2,962, TE&L Sur., 15 mi. SW Breckenridge, dry, TD 4,254 ft., Caddo 3,424 ft., Ellenburger 4,150 ft.

CANADIAN FIELDS

Independent Gets Producer in Leduc

CHATHAM.—In Leduc field, Globe-Leduc West 2, LSD 9, 34-50-26w4, a mile northwest of production, is the first commercial producer completed by an independent company in the field. A 22-minute drill-stem test in the top 15 ft. of the D-3 zone of the Devonian showed gas at the rate of 6,900,000 cu. ft. a day. Coring continued at 5,215-20 ft. showed bubbles of oil. A later drill-stem test at 5,269 ft. yielded good showings, and coring continued to 5,284 ft. when the well blew in with initial flush of 80 bbl. an hour. Globe-Leduc West 1, LSD 6, 19-50-26w4, 3 miles west of the main field, got the Devonian at 4,450 ft., 57 ft. higher than estimated, and is deepening.

Imperial-Leduc 7, LSD 4, 15-50-26w4, finished at 5,397 ft., kicked off at 204 bbl. for the first 6 hours, comparable with flush production of other Imperial wells. Imperial 8, LSD 7, 26-50-26w4, south offset to Imperial 3, is below 5,180 ft. and coring for the D-3 zone, with early completion expected. Imperial had four other wells drilling.

B. A. Pyrcz 1, LSD 12, 25-50-26w, is deepening, after drill-stem test at 5,310-47 ft. Okalta-Leduc 1, LSD 13, 7-50-25w4, outpost test to the east, is coring below 5,493 ft. Leduc Conoslidated 1, LSD 10, 25-50-26w4, is below 4,935 ft. and should be an early completion. Four other independent tests are drilling, and one standing.

Among outlying tests, Imperial-Looma 1, LSD 4, 10-50-23w4, to the east is being abandoned at 6,500 ft. South of the field, McColl-Frontenac Wizard Lake, LSD 14, 14-48-27w4, is coring below 5,797 ft. Fc-Coll-Frontenac Bigstone Creek, LSD 1, 20-46-26w4, is below 5,829 ft.

Jumping Pound.—In the Jumping Pound area west of Calgary Shell 5-7-1, LSD 5, 7-25-4w5, has encountered the Devonian limestone objective at 12,229 ft. This is the first time the Devonian has been reached in the southern foothills, a Turner Valley test drilled some years ago with the Devonian as an objective having been discontinued when, after passing through the Madison into the Banff, it encountered a low angle fault undercutting the structure and passed into more recent formations.

Millet.—In the Millet area, outlying Leduc field, Millet-Leduc 1, LSD 16, 6-48-24w4, is deepening after encountering gas, estimated 100,000 cu. ft. a day, in the Viking sand. A joint test is being started in the same general area by Ashley Gold & Oil Minerals, Ltd., and McColl-Frontenac Oil Co. at a location higer on structure than the Millet-Leduc well.

Ontario.—In the Ontario fields, Imperial Oil has finished a gasser in a new potential field near Killam, in Lambton County, a few miles from the Becher field in Sombra Township. Additional test will be drilled. Development is also continuing in Becher field, which is expected to deliver around 2,500,000 cu. ft. a day when a 3-mile pipe line linking it with the Union Gas Co. transmission line is completed.

In Grey County, Albert Weiss of Toronto has leased acreage in the Leith and Annan districts some 6 miles northeast of Owen Sound and is arranging to drill. The Trenton limestone, at about 1,200 to 1,400 ft., is the potential producing horizon.

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SOUTHWEST TEXAS

Small Gas Discovery Logged for Starr County

CORPUS CHRISTI.—A small gas discovery 6½ miles east of Rio Grande City, in southern Starr County, W. B. Osborn and Mid-Continent Petroleum Corp. 1 John Clopton was gaged at 200,000 cu. ft. of gas and 1 bbl. of oil per day on open flow, and was shut in, with shutin pressure of 1,000 psi. Total depth is 6,256 ft., with 5½-in. casing at 6,035 ft. Production is through perforations at 5,660-67 ft.

Newman Bros. and Skinner & Eddy Corp. 7-A South Texas Syndicate, outpost east of oil production at Greens Branch field in McMullen County, ran electrical log to 5,800 ft. and shut down for orders, after having tested gas and oondensate in two new sands in the Wilcox zone. On a 20-minute drill-stem test at 5,253-64 ft. recovered 10 gal. of condensate; test at 5,482-92 ft. also recovered 10 gal. of condensate in 20 minutes. This well is in J. Fitzpatrick Survey 20. Regular oil production in this field comes from the Reklaw-Carrizo contact at the 3,900-ft. level, and two Wilcox sands have produced gas at 5,682-95 ft. and at 5,719-26 ft.

A new pay zone for Squire field of Duval County has been opened by Santa Clara Oil Co. and John F. Camp & Sons 3-C Jas. F. Welder Heirs. The new zone is the Strake sand and was topped at about 3,215 ft. On potential test it flowed 239 bbl. of oil per day through a 7/32-in. choke, with gas-oil ratio of 216, tubing pressure 245 psi., casing pressure 392 psi., with production through perforations at 3,220½-27½ ft. Total depth is 3,280 ft., with 5½-in. casing on bottom. This field is 3 miles south of Strake field.

Magnolia Petroleum Co. 1 Lohmann Heirs, on the southeast flank of La Gloria

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field, in Brooks County, is testing gas and condensate through perforations at 8,795-8,828 ft. in a prospective new pay zone for the field. Total depth is 9,200 ft., with 7-in. casing set at 8,857 ft.

Kirkwood & Morgan 1 McLean, 1½ miles southwest of Charlotte field production, in Atascosa County, has set 5½-in. casing on top of the Navarro sand zone and will test for production. Total depth is 5,237 ft., and top of the Navarro was at 5,156 ft. This well is located in J. Poitevent Survey 1.

SOUTHWEST TEXAS SUCCESSFUL WILDCAT

Duval County: New oil pay, Squire field—Santa Clara Oil Co. and John F. Camp & Sons 3-C Jas. F. Welder Hrs., in M. G. Nunez Sur. 4, TD 3,280 ft., top sand 3,215 ft. (Strake sand), perf. 3,220½-27½ ft., IP: 239 bbl. oil per day through a 7/32-in. choke, gas-oil ratio 216, TP 245 psi., CP 392 psi., no water.

SOUTHWEST TEXAS WILDCAT FAILURES

Caldwell County: F. C. Cooper and National Well Servicing Co. 1 N. B. Langley, in Michael Gillam Sur., 1½ mi. NE of Prairie Lee, dry, TD 2,257 ft.

Georgia-Tex Oil Co. 1 Austin Nix Est., Gidon Pace Sur., near Bastrop County line, 1 mi. E of Lytton Springs, dry, TD 2,100 ft., top Austin chalk 1,640 ft., top Edwards lime, 1,990 ft.

Duval County: Santa Clara Oil Co. and John F. Camp & Sons 1-E Jas. F. Welder Hrs., in M. F. Andross Sur. 24, 13 mi. NW of San Diego, dry, TD 4,810 ft.

Texon Royalty Co. 1 Mariano Valdez, Survey 353, 8 mi. NE of Bruni, dry, TD 3,300 ft.

Nueces County: Monday Oil Co. et al 1 Eugenia Walsh, in Rincon de Corpus Christi Grant, 1 mi. SW of East Flour Bluff field, dry, TD 7,500 ft.

Webb County: Ray De Lay 1 J. E. Neal, in J. E. Neal Sur. 1008, 2 mi. SE of Oilton, dry, TD 2,200 ft.

Zavala County: Jerkins Oil Co. 1 Ike T. Pryor, in Antonio Aguirre Grant, 8 mi. NE of La Pryor, dry, TD 3,546 ft., top Buda lime 2,377 ft., Del Rio 2,480 ft., Georgetown 2,596 ft.

LA.-ARK.

Lafayette County Test Deepened to 9,060 Ft.

EL DORADO.—McAlester Fuel Co. 1-A McDonald, SW NW 23-17s-24w, Lafayette County, was deepened to 9,060 ft. in Smackover limestone, but plugged back to 9,053 ft. to resume testing of a distillate zone. A drill-stem test at 9,055-60 ft., open 8 hours, showed only a small amount of gas. Operators then plugged back and perforated between 9,044-50 ft., treated with 2,000 gal. of acid, after which it made an estimated 30 to 40 bbl. of distillate in 24 hours. Flow was through open tubing and gas was estimated at 500,000 cu. ft. a day. Location is 2 miles northwest of McKamie field, which produces distillate from the Smackover and oil from the Cotton Valley.

Other Arkansas wildcat reports included Carter Oil Co. 1 L. Isom, 33-9s-1w, Desha County, drilling below 4,172 ft. Stassi & Stratton, 25-6s-9w, Jefferson County, drilling below 4,280 ft. Original projected depth was said to be 4,000 ft. Barnsdall Oil Co. 1 Bodcaw Lumber Co., 8-18s-23w, was drilling below 4,500 ft.

In DeSoto Parish, E. C. Laster 1 Witherspoon, 3-14n-14w, had total depth at 5,389 ft. in the lower Glen Rose. Perforations at 5,254-66 ft. brought gas to the surface in 15 minutes and worked up a maximum pressure of 170 lb., then died to 5 lb. Operators shut it in and pressure rose to 900 lb. in 40 minutes. Plans were to acidize through the perforations. This is a renewal of an old Paluxy test which stopped at 4,201 ft.

In Union Parish, 9 miles southwest of

Farmersville, Pan American Producing Co. 1 Elva Bugg, 31-20n-1w, was coring below 5,225 ft. Higher cores recovered a slight gas odor at 4,831-38 ft., and a distillate odor at 4,848-58 ft. A drill-stem test at 4,829-4,868 ft., open 40 minutes, recovered 270 ft. of gas-cut mud, 540 ft. of gas-cut salt water, and 2,460 ft. of salt water.

NORTH LOUISIANA WILDCAT FAILURE

Union Parish: L. & M. Drilling Co. 1 M. E. Compton, Jr., SW SW NE 2-21n-1w, dry, TD 2,501 ft., chalky shale 2,131 ft., shale 2,151 ft.

NORTH LOUISIANA WILDCAT FAILURES

Arkansas County: David J. Flesh 1 Rosencrantz, NE SE 2-3s-6w, dry, TD 3,633 ft., Wilcox 560 ft., Midway 2,253 ft., Nacatoch 3,024 ft., Base Annona 3,350 ft.

Ashley County: McAlester Fuel Co. 1-E Crossett Lumber Co., SE SE 1-17s-7w, dry, TD 3,810 ft., Gas Rock 2,870 ft., elevation 160 ft.

Miller County: Big Chief Drilling Co. 1 A. N. Froid, NW SE NW 29-17s-27w, dry, TD 6,005 ft., Paluxy 3,622 ft., Massive anhydrite 5,255-5,445 ft., James lime 5,944 ft., elevation 242 ft.

KANSAS

Prospective Arbuckle Pool Opener in Rooks County

HARBAR DRILLING CO. et al. 1 Baumgarten, NE NE NE 25-9s-19w, Rooks County, swabbed 3 bbl. oil per hour from Arbuckle. Pipe is set 2 ft. in Arbuckle at 3,631 ft. Total depth is 3,636 ft. Well was treated with 500 gal. of acid. Top of Arbuckle was logged at —1,431 ft. which is about 20 ft. lower than the same formation in the Paradise Creek pool, which is located about 2½ miles to the east.

Cities Service Oil Co. 1-B Hilger, SW NE NE 21-9s-18w, Rooks County, extends the Paradise Creek pool ¼ mile to northeast with a maximum well. Arbuckle was logged at —1,404 which is about 6 ft. higher than Arbuckle was found in the original completion in NW NW SE, Sec. 21.

Musgrove Petroleum Corp. et al. 1 Lanterman, NW NW NW 23-22s-12w, Stafford County, has pipe set on top of Arbuckle to test oil show found in top 2 ft. of that formation. Drill-stem test 138 to 146 ft. in Lansing recovered 85 ft. of oil-cut mud. Lansing was topped at 3,304 ft.

KANSAS WILDCAT FAILURES

Barton County: Derby Oil et al 1 Simmons, SE SW SW 3-18s-11w, dry, TD 3,361 ft., Lansing-Kansas City 3,019 ft., Arbuckle 3,328 ft. with a show of oil.

Ford County: Texas Co. 1 Barngrover, SW NW NE 35-27s-24w, dry, TD 6,172 ft., anhydrite 1,142 ft., Herrington 2,630 ft., Winfield 2,700 ft., Fort Riley 2,800 ft., Florence 2,842 ft., Basal Florence 2,914 ft., Lansing-Kansas City 4,367 ft., Heebner 4,230 ft., Leavenworth 4,233 ft., Basal Kansas City 4,700 ft., Mississippi lime 5,056 ft., Simpson 5,826 ft., Arbuckle 5,960 ft.

Graham County: Anderson-Prichard and Texon 1 Buss "A," SW SW NW 13-9s-22w, dry, TD 3,904 ft., anhydrite 1,825 ft., Lansing-Kansas City 3,542 ft., conglomerate 3,860 ft., Arbuckle 3,883 ft.

Meade County: Helmerich & Payne 2 Adams, C SE SE 36-34s-30w, dry, TD 6,434 ft., Herrington 2,584 ft., Krider 2,613 ft., Winfield 2,702 ft., Fort Riley 2,850 ft., Morrow 5,880 ft., Mississippian 5,904 ft., sand 6,195 ft.

Rooks County: Westgate-Greenland 1 Dartos, SE SE SE 15-9s-19w, dry, TD 3,583 ft., anhydrite 1,545 ft., Heebner 3,284 ft., Lansing-Kansas City 3,321 ft., Basal Kansas City 3,542 ft., Arbuckle 3,559 ft.

Sedgwick County: J. P. Gaty 1 Nickel, SE NW SE 24-26s-2e, dry, TD 3,252 ft., Mississippi lime 2,870 ft., sandy dolomite 3,206-10 ft., no shows.

Stafford County: Mouser Drilling and Western Exploration 1 Kasselman, SE SE NW 8-21s-11w, dry, TD 3,531 ft., anhydrite 557 ft., Topeka 2,740 ft., Lansing-Kansas City 3,147 ft., cherty conglomerate 3,408 ft., Arbuckle 3,482 ft.

OKLAHOMA

Wilcox Sand Discovery Flows 50 Bbl. Per Hour

DEEP ROCK OIL CORP. 1 Black, SE SE NW 17-10n-2e, Pottawatomie County, flowed 50 bbl. oil per hour on drill-stem test at 6,014-26 ft. from Wilcox sand topped at 6,013 ft. Pipe was set at 6,015 ft. and total depth is 6,026 ft. After drilling plug and running tubing oil flow was estimated at 50 bbl. per hour through 1-in. tubing choke. Hunton was logged at 5,522 ft. and Viola at 5,872 ft.

Magnolia Oil Co. 1 Pharoah, NW NE NW 15-3n-2w, Garvin County, the east offset to the Biffle 1 Pharoah, NW NW NW 15-3n-22, which opened the North Antioch pool, flowed 2 bbl. distillate per hour for 24 hours through 12/64-in. choke. Hole was drilled to 5,649 ft. and plugged back to 5,526 ft. Pipe is set at 5,487 ft.

On the north end of Southwest Antioch pool, Sinclair Prairie 1 Guthrie, NW SW NE 18-3n-2w, is making completion tests. The well flowed 163 bbl. oil in 2 hours from perforations at 6,488-6,531 ft. This completion will extend the Southwest Antioch pool ½ mile to the north.

Sohio Oil Co. is offsetting its 1 Purtle, SE SE NE 23-1n-2e, Murray County, on all four sides. The 1 Purtle produced 15 bbl. of 16°-gravity oil per hour for 7 hours, by swabbing, from McLish topped at 1,490 ft. Another exploratory operation in Murray County is Anderson-Prichard 1 Chipman, NW SW NE 11-1s-2e, a tight hole which is reported, unofficially, to be drilling below 3,000 ft.

OKLAHOMA SUCCESSFUL WILDCATS

Kay County: New pay in Thomas pool—Joe Goldenstern (old Phillips lease) 4 Chambers, C S/2 SW NE 9-25n-2w, pumped 54 bbl. of distillate (46° gravity) per day from Arbuckle at 4,532-40 ft.; Dewey 2,925 ft., Perry 3,055 ft., Layton 3,340 ft., Checkerboard 3,664 ft., Big Lime 3,777 ft., Cherokee 3,900 ft., Mississippi chat 4,123 ft., Woodford 4,236 ft., Misener 4,269 ft., dense 4,270 ft., Wilcox 4,295 ft., TD 4,540 ft.

Oklahoma County: New pool — Harper-Turner, Schock & Tarr 1 Hyden, SE SE NW 10-14n-3w, pumped 185 bbl. of 36°-gravity oil per day from second Wilcox at 6,526-34 ft.; Oswego 5,780 ft., Bartlesville 6,014-22 ft., Hunton 6,049 ft., Sylvan 6,194 ft., Viola 6,386 ft., Wilcox 6,434 ft., TD 6,561 ft.

Seminole County: New pay in Gar Creek pool—Gulf et al 1 Patterson, NE NW NE 17-10n-7e, pumped 23 bbl. of 37°-gravity oil per day from Cromwell at 3,718-23 ft.; Booch 3,580-3,610 ft., Gilcrease 3,648-78 ft., TD 3,734 ft.

Extension to Southeast Sylvian—Gulf 1 Bob, SE NW SE 22-10n-7e, pumped 16 bbl. of 39°-gravity oil per day from Booch at 3,470-90 ft.; coal 2,625 ft., Inola 3,190 ft., brown lime 3,320 ft., Lower Gilcrease 3,580-90 ft.; sand 3,600-40 ft., Wapanucka 3,645-70 ft., Cromwell 3,670-3,740 ft., Caney 3,766 ft., TD 3,811 ft.

OKLAHOMA WILDCAT FAILURES

Cotton County: Fred Jones 1 Thurman, NE NE NW 26-3s-12w, dry, TD 2,516 ft., Pontotoc 1,320 ft., sand 2,148-54 ft., no shows.

E. C. Harlin, Jr., 1 Eastman, S½ SW SW SE 18-4s-12w, dry, TD 2,110 ft., sand 1,139-49 ft., sandy lime 1,364-76 ft., sand 1,459-88 ft. and 1,628-35 ft.

Creek County: O. G. Harper et al 1 Werrell, SE SW NE 14-15n-7e, dry, TD 1,533 ft., Oswego 2,570 ft., Bartlesville zone 3,000 ft., Mississippian Caney 3,500 ft., Mississippi lime 3,540 ft., Woodford 3,760-70 ft., fault, Mississippi lime 3,540 ft., Woodford 3,820-30 ft., Sylvan 3,830 ft., Viola 3,900 ft., dense 3,921 ft., Wilcox 3,928-40 ft., second Wilcox 3,952 ft.

Lincoln County: Faultline Oil Co. 1-A Holbrook, SW SW NE 19-17n-3e, Checkerboard 3,400 ft., conglomerate 3,448 ft., Big lime 3,880 ft., Oswego 3,930 ft., Prue 3,984 ft., Verdigris 4,042 ft., Skinner 4,054 ft., Red Fork 4,131 ft., Inola 4,176 ft., Bartlesville 4,192 ft.

Portable 1 Ross, SW SW NW 32-17n-3e, Perry sand 2,521 ft. Upper Layton 2,766 ft., Hogshooter 3,114 ft., Lower Layton 3,135 ft., Checkerboard 3,399 ft., conglomerate 3,428 ft., Oswego 3,885 ft., Verdigris 4,055 ft., Skinner 4,060 ft., Red Fork 4,154-64 ft. with slight stain of oil, Inola 4,200 ft., Bartlesville 4,205 ft., Mayes 4,432 ft., Woodford 4,493 ft., Hunton 4,543 ft., Sylvan 4,591 ft., Viola 4,674 ft., dense 4,705 ft., dolomite 4,724 ft., Wilcox 4,744 ft., second Wilcox 4,829 ft.

Noble County: Clark & Cowden 1 Earl, C NW NW 28-22n-2w, dry, TD 5,173 ft., Avant 3,456 ft., Layton 3,856 ft., Big lime 4,280 ft., Bartlesville 4,674 ft., Mississippi lime 4,798 ft., Woodford 4,906 ft., Misener 4,938 ft., Viola 4,946 ft., dolomite 5,002 ft., Wilcox 5,018 ft., second Wilcox 5,120 ft.

Seminole County: Paul Traugh 1 Sturgeon, SE NW SE 16-6n-7e, dry, TD 1,868 ft., Hogshooter 462 ft., Wewoka 1,130 ft., Upper Calvin 1,310 ft., Lower Calvin 1,418 ft., Senora lime 1,718 ft., Senora sand 1,790 and 1,840 ft.

D. E. Edwards 1 Harjo, SW SE SW 1-6n-5e, Belle City 875 ft., Calvin 2,295 ft., Senora lime 2,535 ft., Senora sand 2,550 ft., brown lime 3,000 ft., Union Valley 3,010 ft., Cromwell 3,025 ft., Mayes 3,700 ft., Woodford 3,800 ft., Sylvan 4,050 ft., Viola 4,145 ft., Simpson dense 4,190 ft., Simpson dolomite 4,250 ft.

Stephens County: Harper 1 Hawthorne, NE SE NW 12-1s-9w, dry, TD 2,354 ft., sand 2,330 ft. with a show of gas.

CALIFORNIA

Paloma Well Flows Gas and Distillate

LOS ANGELES.—Pacific-Western Oil Corp. has completed what promises to be the best well yet drilled in the Paloma field of Kern County. On initial potential tests, their 76 Noel fee, 29-31s-26e, flowed at the rate of 1,500 bbl. per day of 52.5°-gravity oil from a total depth of 11,041 ft. Gas flow was estimated to be between 1,500,000 and 2,000,000 cu. ft. daily, and water cut was estimated at 0.1 per cent. The well has since been choked back and currently is producing at the rate of 350 bbl. daily through a 15/64-in. choke. Current gas production is 1,800,000 cu. ft. daily with 2,425 lb. tubing pressure and 1,400 lb. casing pressure.

One of the most interesting developments of the past week occurred at the Rothschild-Bender Oil Operations 8 Sheep Springs, 17-29s-21e, a recent discovery well in the Cymric area of Kern County. During the week the well started flowing oil and by the end of the week was producing at the rate of 250 bbl daily through an 18/64-in. choke. Gravity of the oil is 43.0° and water cut 0.1 per cent. Gas flow continues strong with the well making an estimated 2,000,000 to 5,000,000 cu. ft. daily. Tubing pressure was gaged at 1,710 lb. and casing pressure at 1,910 lb. The company has set whipstock at 2,730 ft. in the 4 Anderson, 20-29s-21e, and is redrilling at 2,950 ft. Objective of the second test is the Oceanic sand, which is the productive zone in the discovery well, the 8 Sheep Springs.

Russell E. Havenstrite, testing a new deep producing zone in the Del Valle field at his 15 Lincoln, 16-4n-17w, has announced that he will reperforate the zone at 10,100-

10,300 ft. for additional testing. The well originally flowed an estimated 300 bbl. of oil daily during a formation test made at 10,942-11,742 ft. Operator, however, drilled ahead in search of further producing zones. After finding nothing else of interest at greater depths, the well was plugged back and perforated at 10,100-10,300 ft. for conclusive tests of the apparent new deep zone. Tests were without result, leading operators to believe that the zone under interrogation is not open, and consequently, more perforations will be made before testing is resumed.

Standard Oil Co. of California currently is redrilling below 10,000 ft. at their recent discovery in the Middle Dome area of Kettleman Hills. The 73-30V, 30-23s-19e, which opened a new deep zone in the Middle Dome, was never successfully completed due to a fishing job at total depth of 12,389 ft., although it indicated very substantial production. It subsequently was plugged back and sidetracked and should reach the original producing zone before many weeks. This well has attracted considerable interest since the Middle Dome has never produced much oil and has produced none at all during the past several years. Should the 73-30V definitely confirm discovery of a deep producing zone, it will probably lead to a very active drilling campaign in the area.

CALIFORNIA SUCCESSFUL WILDCAT

Butte County, Durham area: Standard Oil Co. of California 1 Wahl, 32-21s-1e, IP 5,320,000 cu. ft. gas through ½-in. choke, 5½-in. casing 2,220 ft., perf. 2,090-2,100 ft., 2,108-20 ft., 2,125-40 ft., and 2,143-49 ft., top Donohoe sand 2,090 ft., elev. 120 ft., TD 2,326 ft.

CALIFORNIA WILDCAT FAILURES

Fresno County, Northeast Coalinga area: Standard of California 58-12 Mitchem, 12-19s-15e, dry, elev. 749 ft., TD 4,727 ft.

Kern County, Arvin area: Louis H. Didier 1 Didier, 10-31s-30e, dry, elev. 1,000 ft., TD 910 ft.

Cymric area: Independent Exploration Co. 21 Cymric, 21-29s-21e, dry, elev. 820 ft., TD 5,256 ft.

Elk Hills area: Standard of California 67-8G U.O.N.P.R., 8-31s-24e, dry, elev. 662 ft., TD 3,553 ft.

McDonald Anticline area: Mar-Roo Syndicate 44, 33-27s-19e, dry in gray sand, elev. 1,050 ft., Point of Rocks 1,800 ft., TD 2,368 ft.

McKittrick area: Victor Exploration Co. 1, 32-29s-22e, dry in Miocene shale, elev. 672 ft., TD 5,902 ft.

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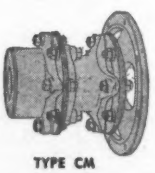
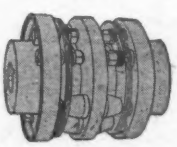


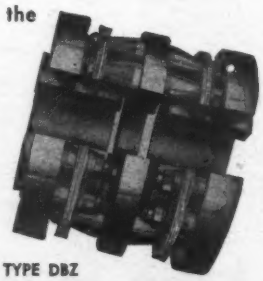
TYPE CM

Drilling Engineers get the most out of their equipment with Thomas "Flexible" Couplings on Engine, Gear and Mud Pump Drives.



TYPE DBZ-S

In the Laboratory Thomas "Flexible" Dynamometer Couplings assure the greatest accuracy.



TYPE DBZ

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WARREN, PENNSYLVANIA

ROCKY MOUNTAIN

Northern Wyoming Gets Sweet-Oil Producer

DENVER.—Northern Wyoming apparently has scored again with a discovery of sweet oil in the Frontier in General Pearoleum Corp. 45-26-Government, NE NE SW 26-46n-91w, South Sand Creek structure, Washakie County. Last total depth reported was 6,728 ft. The tentative top of the third Frontier is 6,690 ft. A drill-stem test was taken at 6,692-6,720 ft., open 38 minutes. While it is confirmed that oil was recovered, no official release was made as to the results. From unofficial sources, however, it was reported to have flowed at the rate of 445 bbl. per day. Whether the well will be completed at present depth or continued to lower horizons has not been announced.

The structure is out in the southeastern part of the Big Horn basin, 4½ miles east of the South Fork discovery well in 24-46-92, completed by General Petroleum earlier this year for 202 bbl. per day. It is 11 miles northeast of Neiber dome, also a discovery this year in the Embar for about 800 bbl. per day.

Northeast Elk Basin discovery.—Sinclair-Wyoming Oil Co. 1 Wilkins, NW SW NW 28-9s-23e, Northwest Elk Basin, Carbon County, Montana, a discovery 3 weeks ago, flowed 4,920 bbl. of 32°-gravity oil from the Madison at a total depth of 6,795 ft. on an official 24-hour gage, making it one of the largest completions in several years in the region. Top of the Madison was at 6,215 ft. Location is 3¼ miles northwest of 38-M Unit well, the discovery in the Madison in Elk Basin proper. Structurally, it is approximately 1,918 ft. lower on the Madison than the Elk Basin well. The Wilkins well is separated from the field proper by a deep fault and is classed as a separate pool at present. It is within the Tensleep unit at Elk Basin, but outside the participating area. A meeting of unit operators is scheduled for next week at which time the question of producing from the Madison will be discussed. Strong opposition to developing the new horizon is manifest on the ground that Tensleep production is ample for market requirements.

Madison at Cut Bank.—Carter Oil Co. 1-A O. I. Surber, C SE SW 12-36n-6w, a south outpost in the northern Cut Bank lime pool, flowed 486 bbl. of oil per day through a 32/64-in. choke from the Madison at 3,127 ft. total depth. Casing was perforated at 3,102-25 ft. and hole was acidized with 2,000 gal. Tubing pressure was 125 psi. and casing pressure 350 psi.

Kutz Canon test to go deeper.—Paul B. English-Byrd-Frost, Inc., 1 Government, C NW SW 4-27n-10w, Kutz Canon field, San Juan County, New Mexico, which a few months ago was widely heralded as a discovery in the Dakota, is to be deepened from 5,745 ft. Condition of the hole has been reported as such that actual results of the test are problematical, although it had good shows of oil and gas. Stanolind Oil & Gas Co. is reported to have relinquished its interest in the well. El Paso Natural Gas Co. is reported to have acquired the Stanolind interest, and contract has been let to Helmerick & Payne to complete the hole to the Morrison and test the upper sands. Heavy duty rotary is being moved in. Tools are in the hole at 6,660 ft.

WILDCAT EXTENSION IN WYOMING

Ant Hills, Nobrara County: Arrow Oil Co. 1 Wessenberger, SW NE SW 1-36n-63w, TD 4,837 ft., swbd. 112 bbl. in 24 hours, 36.5 gr., from Muddy sand, top 4,725 ft., elev. 4,050 ft., extension 4 mi. north of nearest producer.

SUCCESSFUL WILDCAT COMPLETION IN MONTANA

Northwest Elk Basin, Carbon County: Sinclair-Wyoming Oil Co. 1 Wilkins, NW SW NW 28-9s-23e, TD 6,795 ft., flowed 4,920 bbl. in 24 hours from Madison after acidizing. Gr. of oil 32 degrees. Elev. 4,470 ft. ground. Frontier 2,990, Dakota 4,377, Morrison 4,460, Chugwater 5,334, Dinwoody, 5,853, Phosphoria 5,872, Tensleep 5,910, Madison 6,215 ft. Gas and oil in Frontier, Dakota and Tensleep cased off.

WILDCAT FAILURE IN MONTANA

Reagan, Glacier County: Montana Power Co. 2 Tribal-355, C SE SW 3-36n-7w, TD 3,792 ft., P. & A. Kootehai 2,940, Sunburst 3,510-25, Cut Bank 3,525-73, Madison 3,755 ft., ground elev. 4,090 ft.

OHIO, KENTUCKY

Good Well in Deeper Zone Shown in Perry County

COLUMBUS.—The John Morrow 2 Lizzie Henderson, Section 28, Madison Township, Perry County, which made considerable gas in the top of the Clinton, has been drilled through the sand with 2,500 ft. of oil standing in the hole. This showing is equal to the better wells in the pool and will be shot before it is completed.

An unusually good Corning Grade well was completed by Shuff & Bucy on 1 Ora Johnson, Section 14, Jackson Township, Knox County. Clinton sand at 2,948-3,000 ft. was shot and made 133 bbl. in 24 hours. The company moved ¼ mile northeast for its next well.

R. Hanlon et al struck a big flow of gas in the 5 Catherine Lohman, Section 15, Grandview Township, Washington County. The well gaged 800,000 cu. ft. in the Keener sand at 1,510-33 ft. and is just north of oil production from the same sand.

WILDCAT FAILURES COMPLETED IN OHIO

Muskingum County, Salt Creek Township: Four Way O. & G. 1 C. W. Tumblin, Sec. 11, Clinton 4,384-4,435 ft., Medina 4,498-4,503 ft., TD 4,507 ft.

Richland County, Mifflin Township: Ditch & Bashford 1 Leila Boals, Sec. 9, no Clinton, TD 2,437 ft.

EASTERN KENTUCKY

ASHLAND.—Two completions, one for more than a million cubic feet, were noted during the week's operations: Kentucky-West Virginia Gas Co. 5736, S. B. Leslie, Pike County, produced 133,000 cu. ft. in shale, A.S., TD 3,282 ft., and No. 5746, M. B. Goble, Martin County, brought 1,309,000 cu. ft. in Maxon, TD 962 ft.

Pure Oil Co.-Stanolind Oil and Gas 1-A J. C. McKnight, 7-H-67 Laurel County, filled up 1,500 to 2,000 ft. with oil from Knox dolomite, topped at 3,293 ft. Total depth is 3,529 ft. Gas volume is small. After being shut in over night, well flowed 35 bbl. oil in 1 hour. Operators are connecting flow lines to test.

WESTERN KENTUCKY

OWENSBORO.—George S. Engle 1 J. A. Dixon, 2-L-24, Webster County, recovered gas in 5 minutes, and flowed clean oil in 80 minutes on drill-stem test in Tar Springs at 2,546-72 ft. Oil flow was estimated at 30 bbl. per hour. After setting pipe at 2,555 ft., well swabbed and flowed 20 bbl. oil per hour. Total depth is 2,573 ft. Lower Kincaid was logged at 2,156 ft., Menard at 2,308 ft., and Viola at 2,486 ft. This test is about 7 miles south of nearest wells in Sebree pool.

Rodney Mitchell 1 Bertha Kellin, 17-P-21, Henderson County, started flowing at rate of 40 bbl. oil per hour from McClosky pay at 2,632-36 ft. and 2,648-54 ft. after being treated with 5,000 gal. acid. At the end of 12 hours well stopped flowing. Viola was logged at 1,870 ft., Glen Dean at 2,027 ft., Barlow at 2,279 ft., and Ste. Genevieve at 2,566 ft. The well is located about 1 mile north of production in the Utley pool.

WESTERN KENTUCKY WILDCAT FAILURE

Henderson County: C. D. Burbank 1 Burbank, 22-R-23, dry at 2,575 ft., Lower Glen Dean 1,799 ft., Barlow 2,054 ft., Ste. Genevieve 2,451 ft.

INDIANA

EVANSVILLE.—Calvert & Willis et al 1 Peter Egli, NE SW SW 2-6s-11w, Vanderburgh County, recovered 535 ft. of clean oil and 90 ft. fresh water on 1-hour drill-stem test in Pennsylvanian sand at 875-96 ft. Pipe is set at 875 ft. and operators are cleaning out to test. This well is located about 2½ miles west of the Vanderburgh pool and 4 miles east of the Buckman-O'Neal 1 Wassmer, NE SW SW 6-6s-11w, which is testing Cypress pay at 2,286-96 ft. Wassmer well swabbed 1½ bbl. oil per hour after 20-qt. shot. The same operators are running pipe to test Pennsylvanian sand in 2 Peter Egli, which is a north offset to 1 Peter Egli.

INDIANA SUCCESSFUL WILDCAT

Sullivan County: W. F. Stucker 1 Sanders, 17-7n-10w, completed in Pennsylvanian, pay 680-90 ft., show gas, no IP, TD 690 ft.

ILLINOIS

Reworked Discovery Well Iuka Pool Makes 400 Bbl.

MATTOON.—Gilliam Drilling Co. et al. 1 Ebe, NE NE NW 14-2n-4e, Marion County, the discovery well of the Iuka pool, completed originally in St. Louis at 2 874-84 ft., has been re-worked and made 400 bbl. oil and 50 bbl. water per day from perforations in McClosky at 2,754-61 ft. McClosky was treated with 1,000 gal. of acid.

Gilliam Drilling Co. 1 Hines, NW NW SW 36-5s-10e, White County, has pipe perforated opposite Upper Renault at 2,942-58 ft. Hole filled 60 ft. with fluid which was 50 per cent water.

In Edwards County, 1 mile northwest of Maple Grove pool, tools are below 3,022 ft. in Superior Oil Co. 1 Frost, SW SE NW 32-2n-10e. Glen Dean was logged at 2,683 ft.

Paul Doran is moving in cable tools to test 1 Manning, NE NW SW 14-11n-4e, Shelby County. Aux Vases was logged at 1,864-1,903 ft. Total depth is 1,903 ft.

ILLINOIS SUCCESSFUL WILDCATS

Marion County: Gilliam Drilling Co. et al. 1 Bertha Ebe, NE NE NW 14-2n-4e, completed in St. Louis pay 2,874-84 ft., recompleted McClosky 2,764-61 ft., IP 400 bbl., TD 2,884 ft., 1,000 gal. acid in McClosky.

Ben Taylor 1 Sebastian, NW NE SW 21-1n-2e, IP 9 bbl., Benoist pay 1,917-31 ft., TD 1,931 ft.

ILLINOIS WILDCAT FAILURES

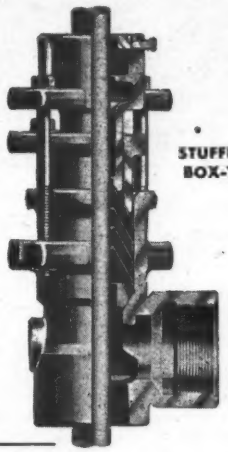
Clinton County: B. F. Williams et al. 1 Sprehe, SW NE NW 6-1n-1w, dry at 1,480 ft., Benoist 1,459 ft., no sand.

Gallatin County: H. V. Spires 1 R. H. Hale, NE NW SW 24-7s-9e, dry 3,130 ft., Glen Dean 2,374 ft., Cypress 2,640 ft., Ste. Genevieve 2,744 ft., McClosky 3,031 ft.

Karber et al. 1 Drone, NE NE SW 7-9s-9e, dry at 2,690 ft., Menard 1,910 ft., Aux Vases 2,735 ft., McClosky 2,824 ft., St. Louis 2,889 ft.

Lawrence County: J. W. Eberhardt 1 Goodwin, SW SE NW 5-4n-10w, dry at 1,623

FULLY PATENTED



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ft., Benoist 1,495 ft., Ste. Genevieve 1,572 ft., McClosky 1,616 ft.

Madison County: J. W. Eberhardt 1 Kolm, NW NE SE 14-4n-7w, dry at 2,323 ft., Cypress 508 ft., Ste. Genevieve 821 ft., Devonian 1,700 ft., Trenton 2,295 ft.

Montgomery County: Ed. White 1 J. Collins, dry at 670 ft., no sand.

Richland County: A. J. Slagter 1 Wetzel, NE SE 13-2n-14w, dry at 3,067 ft., drill-stem test 2,958-95 ft., recovered 2,700 ft. water.

Wayne County: Sohio Oil Co. 1 Weber, NW NW SW 24-1n-9e, dry at 3,267 ft., Ste. Genevieve 3,209 ft., McClosky 3,263 ft.

Fred Noah 1 E. Hoffett, NW NE SW 6-2s-9e, dry at 3,434 ft., Benoist 3,150 ft., Aux Vases 3,280 ft., Ste. Genevieve 3,332 ft., McClosky 3,422 ft.

White County: B. M. Heath 1 Schoemans and Williams, NE NE SE 36-5s-9e, dry at 3,175 ft., Glen Dean 2,467 ft., Cypress 2,713 ft., Benoist 2,929 ft., Ste. Genevieve 3,007 ft., McClosky 3,060 ft.

SUMMARY OF JULY COMPLETIONS

	Comp.	Oil	Prod.	Gas	Dry	Under 1,000 ft.	1,000-2,500 ft.	2,500-5,000 ft.	5,000-10,000 ft.	Over 10,000 ft.	Total footage	Rigs and drilling
New York	194	98	211	0	[1]96	0	194	0	0	0	259,266	169
Pennsylvania	282	142	298	26	[2]114	0	0	282	0	0	450,957	238
West Virginia	95	11	59	60	24	5	47	38	5	0	237,849	261
Ohio	121	25	422	55	[3]41	7	51	62	1	0	335,753	231
Indiana	77	31	1,915	3	43	9	55	13	0	0	135,589	69
Kentucky	66	29	1,713	12	25	12	36	18	0	0	118,714	81
Illinois	187	98	9,042	0	89	14	41	132	0	0	480,245	206
Michigan	103	44	27,729	6	[4]53	2	81	19	1	0	205,363	128
Kansas	264	143	75,020	27	[5]94	1	23	240	0	0	862,582	387
Neb., Mo., Iowa	1	0	0	0	1	0	0	0	1	0	6,788	12
Oklahoma	363	168	23,715	59	[6]136	21	115	179	46	2	1,104,317	512
Texas	1,086	679	131,257	60	347	62	230	422	356	16	4,672,087	1,037
North	271	142	12,046	1	[7]128	35	129	74	33	0	725,386	197
West Central	105	52	4,614	1	[8]52	6	33	64	2	0	304,382	63
West	224	198	79,159	0	26	12	28	101	75	8	1,126,517	173
Panhandle	46	17	1,478	23	6	1	5	39	1	0	140,667	154
Eastern	59	[8]35	7,429	8	16	2	5	21	31	0	327,207	72
Gulf Coast	189	[9]122	12,794	12	55	2	7	49	126	5	1,112,182	213
Southwest	192	[10]113	13,737	15	64	4	23	74	88	3	935,746	165
Louisiana	193	115	13,677	11	67	1	73	45	46	28	1,085,793	226
Northern	119	[11]64	3,690	9	46	1	69	33	15	1	396,082	84
Southern	74	[12]51	9,987	2	21	0	4	12	31	27	689,711	142
Arkansas	24	11	1,667	1	12	0	1	11	12	0	124,101	34
Mississippi	49	[12]35	10,764	0	14	0	0	3	26	20	423,496	89
Ala., Ga., Fla.	6	1	19	0	5	0	0	6	0	0	24,007	20
Montana	26	14	740	4	8	1	17	7	1	0	59,802	77
Wyoming	19	15	5,449	1	3	0	1	14	4	0	82,204	108
Colorado-Utah	21	12	2,420	2	7	3	0	3	15	0	111,123	84
New Mexico	49	40	11,036	5	4	2	6	19	22	0	220,902	129
California	161	131	32,830	4	26	6	30	66	50	9	761,451	259
Total July	3,387	1,842	349,983	336	1,209	146	1,001	1,579	586	75	11,762,389	4,357
Total June	2,783	1,523	291,111	268	992	99	859	1,283	467	75	9,651,547	4,291

Service wells included: [1]96, [2]108, [3]3, [4]23, [5]2, [6]1, [7]5. Distillate wells: [8]2, [9]11, [10]5, [11]1, [12]3.

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Among the

Drilling Contractors

Four Drilling Contractors Change Headquarters

Four drilling contractors in various sections of the country have moved their home offices during the past few weeks. **Taylor Drilling Co.** has moved its home offices from Denver to Lewistown, Mont. **V. R. Bachelor,** formerly located at Rookport, Ind., is now at Repton, Ky. **H. L. Turner,** former Louisiana contractor, is now located in Denver. **Thomas Drilling Co.** has changed headquarters from Artesia to San Angelo, Tex.

California Drilling Company Organized

Rapid Production Service Co. has been organized in Long Beach, Calif., to enter the drilling business. Officers of the new company are: D. H. Graham, president; George Hocking, vice president and superintendent; and D. D. Dunlap, secretary-treasurer.

Gene Reid Drilling Co., Bakersfield, has been awarded contract to drill well No. 44 for the Mar-Roo Syndicate in the Shale Hills area north of Williams field in Kern County, California. Location of this exploratory venture is in 33-27s-19e, and drilling currently is progressing below 54 ft. Gene Reid is also drilling ahead below 1,570 ft. at Rocket Petroleum Co. 3 fee, 31-32s-24e, in Midway-Sunset field of Kern County, California.

Lohmann Johnson Drilling Co. has brought in a producer for Continental Oil Co., the 1 Gilbert, NE NE SE 6-9-18, Rooks County, Kansas. This wildcat swabbed 224 bbl. oil in 8 hours.

Clay & Sons Drilling Co. are planning to drill a test in Pottawatomie County, Oklahoma, the 1 School Land, C SE NW 36-6n-2e.

Moran Brothers, Wichita Falls, are rigging up rotary for a Stanolind Oil & Gas Co. wildcat in Cottle County, North Texas. The test is the 1 T. J. Richards estate, Section 1, I&GN Survey A-148, 4 miles south of Paducah.

Jones & Shelburne, Oklahoma City, are drilling a wildcat for Republic Natural Gas Co., the 1 Rahn, SW SW NW 26-15-24, Trego County, Kansas.

Regent Drilling Co., of Calgary, Alta., has contract with Kitalta Oils for completion of Shunda B-1, LSD 5, 20-55-20w4, in the Bruderhein area northeast of Edmonton. The well, resumed from around 2,500 ft., is to test the Devonian limestone, with

Day-tour crew on deep test being drilled by Meridith, Clegg & Hunt, Houston, for Humble Oil & Refining Co. in Flour Bluff field, Nueces County, South Texas. The men are: L. H. Barrow, W. C. Rodenberry, William Dailey, R. J. dela Morinieri (driller), and C. A. Massoletti

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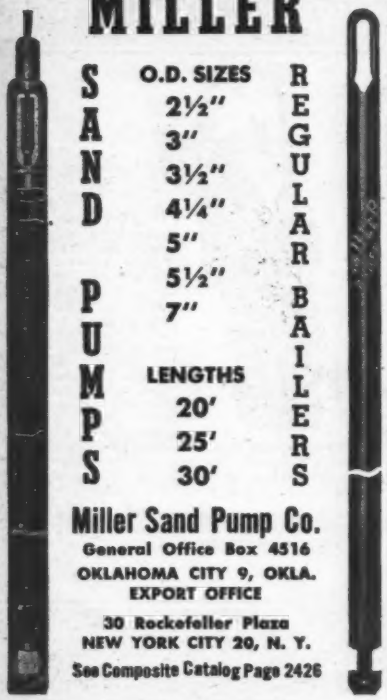

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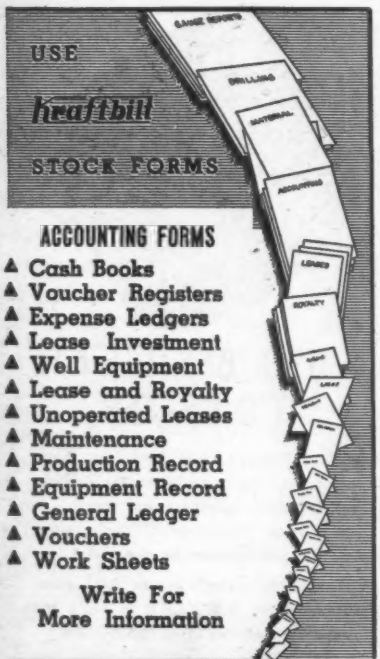

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completion expected around 4,225 ft. and **Denton Spencer Co.** of Calgary are petroleum engineers in charge of the drilling.

Texola Drilling Co., Oklahoma City, has started a 2,250-ft. test in Hughes County, Oklahoma, the 1 J. W. Crawford, SW SW SW 30-9n-11e.

Transit Corp. is moving in to drill a wildcat for Stanolind Oil & Gas Co., the 1 Pundsack, SE SE SW 19-21-13, Stafford County, Kansas.

Jack Grace, Wichita Falls, is moving in for Continental Oil Co. 1 Kate Emmert, William Anglin Survey A-2, Wichita County, North Texas.

Makin Drilling Co., Hobbs, has three rigs running in Eunice area of southeastern New Mexico. The rigs are at work for Tide Water Associated Oil Co., Continental Oil Co., Neville G. Penrose, Inc., and Stanolind Oil & Gas Co.

H. H. & B. Drilling Co., Wichita, has set surface pipe and is drilling ahead on an attempted extension ½ mile north of Palco Townsite pool, Rooks County, Kansas. The well is 1 Pfannenstiel, NE NE NE 17-9-20, and is being supported by Phillips Petroleum Co. and Sunray Oil Corp.

Earl Wakefield, Wichita, is drilling George F. Johnston 1 Kemper, a wildcat, NE NW NE 25-5-21, Norton County, Kansas.

Olson Drilling Co., Tulsa, and **E. M. Wahlenmaier** have filed application to drill a 5,800-ft. Ellenburger wildcat, the 1 Stuart, 660 ft. from south and west lines, E½, Section 7, GW&NG Survey, Sutton County, West Texas.

Rocky Mountain Drilling Co., Los Angeles, has been contracted by the Texas Co. to drill 1 Malis, 10-4n-17w, an exploratory venture in the Val Verde area of Los Angeles County, California. Roads are being graded preparatory to moving in equipment.

Sterling Drilling Co., Sterling, Kans., is rigging up for a test, the J. J. Lynn 1 Petro, NE SW NE 33-23-15, Pawnee County, Kansas.

Harvey Drilling Co., Wichita Falls, is making hole on a wildcat in Cottle County, Texas, its 1 Wilson, M. L. Webster Survey A-1118, 1 mile east of Gainesville.

Wheless Drilling Co., Shreveport, has contract for Arkansas Fuel Oil Co. 8-B DeLoach, a Smackover limestone test in 22-23s-8w, of Haynesville field, Claiborne Parish, North Louisiana.

Drilling Contractors, Ltd., Calgary, Alta., have recently spudded Wabamun Lake 1, LSD 5, 10-51-4w5, an important exploratory test in the Wabamun Lake area 30 miles west of Ed-

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Tong Dies

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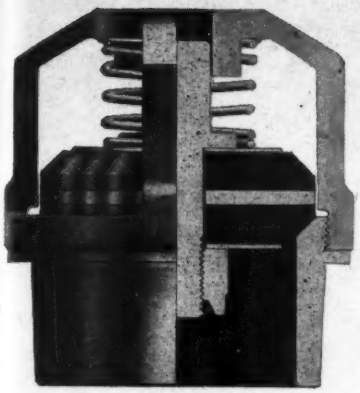

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Durbin-Boomer F-2—2 swivels, ½, ⅝ or ¾" chain

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DIXIE No. 1—2 swivels, ½ or ⅝" chain
LONE STAR 1—2 swivels, ⅜, ½ or ⅝" chain
LONE STAR 2—2 swivels, ½, ⅝ or ¾" chain

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monton for Anglo-Canadian Oil Co., Home Oil Co., and Calgary & Edmonton Corp.

Brown Drilling Co., Long Beach, is under contract for Argus Oil Co. 3 Lagoon, Wilmington field, California.

Penrod Drilling Co., Shreveport, is planning a 9,500-ft. test in Catahoula Parish, Louisiana, its 2 P. L. Mitchell, 34-8n-7e.

Fillmore Drilling Co. has received contract for the first wildcat in a drilling program begun in Washington by Union Oil Co. The test is on Carlisle lease, 18-19n-11w, near Aberdeen, Wash.

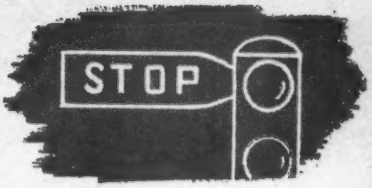
Anderson Drilling Co., Wichita Falls, has staked location for a 2,000-ft. wildcat in Cooke County, North Texas, its 1 H. J. Wolf, Paul Lewis Survey A-565, 1 mile west of Muenster.

Hayes & Sprague Drilling Co., Los Angeles, is grading location for Seaboard Oil Co. 2 Johnson in 17-3s-14w. This will be an offset test to Seaboard 1 Johnson, exploratory venture in the Lawndale area of Los Angeles County, California, which has been showing some gas and oil at a total depth of 8,026 ft. The 1 Johnson is also being drilled by Hayes & Sprague.

Meredith, Clegg & Hunt, Houston, are rigging up an 9,500-ft. contract to drill Warren Petroleum Corp. 1 M. I. Janes, wildcat in Manuel Cherino League, approximately 3 miles east of Fannet, in Jefferson County, Texas.

San Joaquin Drilling Co., Los Angeles, has completed a 2,000-bbl. daily producer for Pacific Western Oil Corp., 2 miles southwest of McKittrick, Kern County, California. The test is Midway-McKittrick A-84-30, 30-30s-22e, and produces 35° A.P.I. gravity oil from two intervals, 4,730-85 ft. and 4,800-45 ft., from Points of Rocks formation. San Joaquin has the contract, also, for a second well, Midway-McKittrick A-73-70, which will be drilled 800 ft. northwest of the discovery.

E. M. Shields, Butler, Pa., has contract with Continental Petroleums, Ltd., of Montreal for drilling its Bald Mountain Anticline 1 well in the Gaspe Peninsula of Quebec. The well, starting in the St. Albans-Silurian formation, is designed to penetrate petroliferous coral reefs at the base of the Silurian, and to test the first 1,000 ft. of the Ordovician, with a possible maximum depth of 4,500 ft. Test has spudded with all-new equipment and an all-American crew operating 24 hours a day. The same contractor has taken over the drilling of two tests for Gaspe Oil Ventures of Montreal, C.P.L. 1, from 2,728 ft., and Venture 2.



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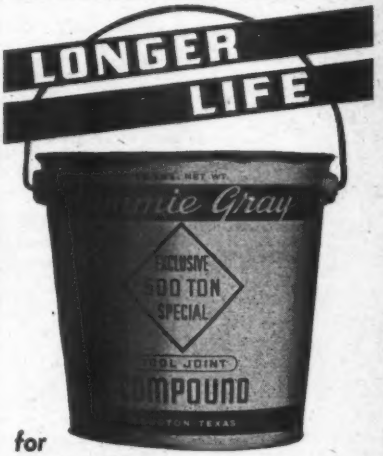

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STATISTICS and

WEEKLY WELL COMPLETIONS . . . WEEK ENDED AUGUST 23, 1947

	Total of all wells					Cum.		Wildcat completions and discoveries					Cumulative total, 1947				
	Comp.	Oil	Gas	Dry	Footage	1947	1946	Oil	Dist.	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
New York	41	21	0	*20	54,533	1,004	1,016	0	0	0	0	0	3	0	0	2	5
Pennsylvania	62	32	5	†25	97,736	1,858	2,563	0	0	1	0	1	0	0	3	1	4
West Virginia	13	1	10	‡2	36,519	530	456	0	0	2	1	3	0	0	12	6	18
Ohio	26	5	12	‡9	72,372	835	774	0	0	0	2	2	0	0	3	32	35
Indiana	10	6	0	4	16,231	400	230	1	0	0	0	1	18	0	0	32	50
Kentucky	18	6	3	9	26,733	426	318	0	0	0	1	1	6	0	0	30	36
Illinois	46	18	0	28	114,812	1,289	1,417	2	0	0	10	12	47	0	1	230	278
Michigan	22	8	3	11	45,038	541	515	0	0	0	8	8	5	0	10	140	155
Kansas	47	24	4	19	148,861	1,642	1,273	0	0	0	7	7	27	0	11	219	257
Neb., Mo., Iowa	0	0	0	0	0	4	15	0	0	0	0	0	0	0	0	4	4
Oklahoma	84	52	3	§29	241,926	2,617	1,688	3	1	0	9	13	62	4	9	435	510
Texas	169	107	7	55	710,849	5,742	5,138	4	4	1	29	38	190	36	60	858	1,144
North Central (Dist. 7-B & 9)	50	26	0	24	123,105	1,863	1,840	0	0	0	10	10	59	0	8	291	358
West (Dist. 7-C & 8)	44	37	0	7	177,064	1,376	1,099	0	0	0	3	3	20	0	3	104	127
Panhandle (Dist. 10)	6	6	0	0	18,519	272	212	0	0	0	0	0	1	0	1	5	7
Eastern (Dist. 5 & 6)	12	2	4	6	55,811	327	478	0	0	0	3	3	5	0	4	73	82
Gulf Coast (Dist. 3)	34	23	2	9	230,202	1,008	1,122	3	4	1	6	14	51	28	26	178	283
Southwest (Dist. 1, 2 & 4)	23	13	1	9	106,148	896	387	1	0	0	7	8	54	8	18	207	287
Louisiana	51	36	1	14	299,554	908	846	3	1	0	4	8	25	16	9	125	175
Northern	28	21	1	6	85,360	508	473	0	0	0	1	1	3	1	3	72	79
Southern	23	15	0	8	214,194	400	373	3	1	0	3	7	22	15	6	53	96
Arkansas	9	6	0	3	40,934	173	114	0	0	0	3	3	1	0	0	34	35
Mississippi	10	8	1	1	79,665	310	155	0	0	0	0	0	0	0	1	58	59
Southeastern States	1	0	0	1	5,505	38	28	0	0	0	1	1	0	0	0	33	33
Montana	11	7	2	2	29,084	171	195	1	0	0	1	2	3	0	5	15	23
Wyoming	5	3	0	2	21,467	142	113	1	0	0	0	1	8	0	2	21	31
Colorado-Utah	2	2	0	0	12,745	128	91	0	0	0	0	0	2	0	1	33	36
New Mexico	10	10	0	0	47,647	337	241	0	0	0	0	0	4	0	1	22	27
California	32	22	1	9	121,435	1,244	1,105	0	0	1	6	7	34	0	6	181	221
Total United States	669	374	52	243	2,223,646	20,339	18,291	15	6	5	82	108	435	56	134	2,511	3,136
Total previous week	722	382	82	258	2,430,118	19,670	17,714	16	3	5	83	107	420	50	129	2,429	3,028
Total August 24, 1946	577	302	72	203	1,881,028			12	1	3	82	98	333	28	82	2,142	2,585

Service wells included: *20, †24, ‡1, §2.

CRUDE PRICES AND REFINERY ACTIVITY

GRAVITY SCHEDULES

Top prices include all gravities above grades designated, and low prices include all gravities below grades designated:

Gravity—	Signal Hill, Calif.*	Okla-homa, Kansas	Gulf Coast Tex.†	West Tex.‡
18-18.9	$1.60	....	....	....
19-19.9	1.65	....	....	....
20-20.9	1.69	$1.55	....	$1.43
21-21.9	1.73	1.57	....	1.44
22-22.9	1.77	1.59	....	1.46
23-23.9	1.80	1.61	....	1.48
24-24.9	1.84	1.63	$1.86	1.50
25-25.9	1.88	1.65	1.88	1.52
26-26.9	1.91	1.67	1.90	1.54
27-27.9	1.95	1.69	1.92	1.56
28-28.9	1.99	1.71	1.94	1.58
29-29.9	2.02	1.73	1.96	1.60
30-30.9	2.06	1.75	1.98	1.62
31-31.9	....	1.77	2.00	1.64
32-32.9	....	1.79	2.02	1.66
33-33.9	....	1.81	2.04	1.68
34-34.9	....	1.83	2.06	1.70
35-35.9	....	1.85	2.08	1.72
36-36.9	....	1.87	2.10	1.74
37-37.9	....	1.89	2.12	1.76
38-38.9	....	1.91	2.14	1.78
39-39.9	....	1.93	2.16	1.80
40 and above	....	1.95	2.18	1.82

*Standard Oil Co. of Calif. posting. †For crude from Daboval, El Campo, and Sandy Point. ‡Includes Lea County, New Mexico.

A.P.I. REFINERY REPORT, WEEK ENDED AUGUST 16

(Thousands of barrels)

District—	Crude runs, daily avg.	Production: Gasoline†	Kerosine	Gas & dist. oil	Residual	Stocks at refineries, bulk terminals, in transit and in pipe lines: Gasoline*	Kerosine	Gas & dist. oil	Residual
East Coast	843	2,124	264	1,208	1,595	20,570	7,862	15,195	9,809
Appalachian:									
District 1	106	321	43	104	99	2,192	298	525	315
District 2	63	254	19	52	106	855	188	131	157
Ind., Ill., Ky.	836	2,941	273	897	1,202	15,232	2,396	6,097	4,566
Okla., Kans., Mo.	437	1,442	120	529	489	6,611	1,041	2,819	1,278
Inland Texas	217	981	90	123	424	2,914	485	522	819
Texas Gulf Coast	1,202	3,862	660	1,568	1,722	12,833	3,076	8,585	6,792
La. Gulf Coast	412	1,144	421	354	517	4,488	1,943	2,531	1,749
N. La. and Ark.	68	175	49	57	116	1,597	349	339	157
Rocky Mountain:									
New Mexico	11	42	3	10	19	82	14	19	31
Other Rocky Mt.	142	482	17	160	201	2,230	155	832	700
California	865	2,288	134	999	2,341	15,379	1,001	14,090	27,627
August 16, 1947	5,202	16,056	2,093	6,061	8,831	84,983	18,808	51,685	54,000
August 9, 1947	5,184	16,163	1,964	5,932	8,757	84,898	18,562	49,545	53,531
August 17, 1946	4,891	15,640	1,775	5,115	8,193	87,015	17,710	49,843	51,913

*Finished and unfinished. †At refineries including natural blended.

Bureau of Mines crude-oil stocks 227,779,000 bbl. as of August 9—down 3,690,000 bbl. One year ago 224,098,000 bbl.

FLAT CRUDE PRICES

Representative posted schedules per bbl.

East Texas	$1.95
Kettleman Hills, California*	2.14
Beauregard Parish	1.90
Illinois Basin	2.07
Pecos County, Texas (Yates)	1.85
Bradford, Pennsylvania	4.30
Eastern Ill. and Western Ind.†	2.07
Tomball, Texas Gulf Coast	2.19

*37°-37.9°. †35° and above.

TRENDS

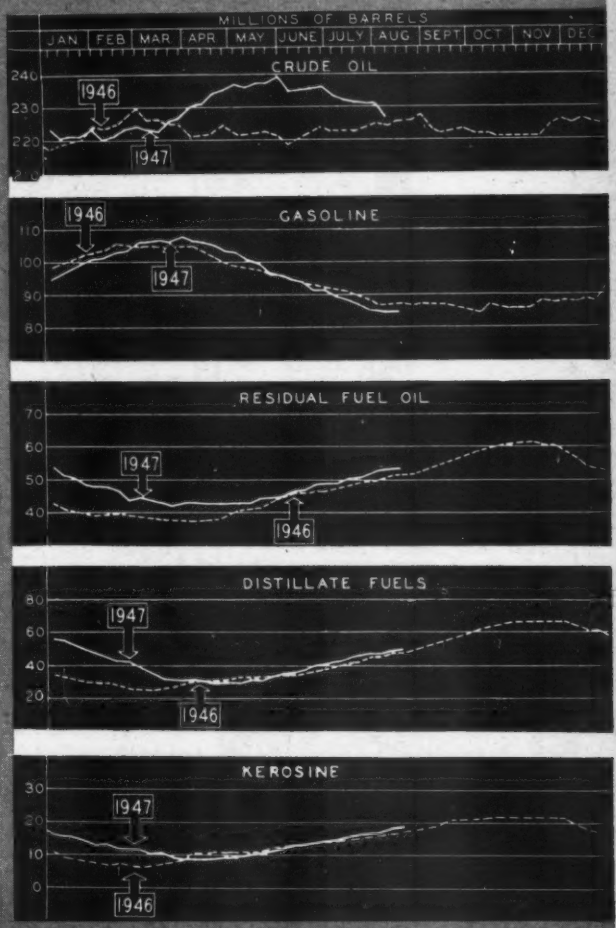
DAILY AVERAGE PRODUCTION FOR WEEK

	Aug. 23 crude oil	B. of M. Aug. demand	Aug. 16 crude oil
Alabama	1,050	1,200	1,200
Arkansas	81,300	81,000	82,400
California	926,000	920,000	925,700
Colorado	43,400	43,000	44,410
Eastern	64,500	65,400	63,500
Florida	950	800	1,000
Illinois	168,000	200,000	174,100
Indiana	17,050	18,000	15,950
Kansas	297,850	305,000	300,350
Kentucky	24,200	27,000	25,000
Louisiana	437,050	437,000	436,100
North Louisiana	107,000	.....	106,050
South Louisiana	330,050	.....	330,050
Michigan	42,015	45,000	47,140
Mississippi	99,905	96,000	98,355
Montana	24,060	24,000	24,110
Nebraska	550	600	550
New Mexico	107,950	106,000	107,950
Oklahoma	391,650	405,000	389,700
Texas	2,306,050	2,255,000	2,306,050
Dist. 1 (Southwest)	23,600	.....	23,600
Dist. 2 (Southwest)	161,175	.....	161,175
Dist. 4 (Southwest)	245,250	.....	245,250
Dist. 3 (Gulf Coast)	487,385	.....	487,385
Dist. 5 (Eastern)	39,480	.....	39,480
Dist. 6 (Eastern)	116,825	.....	116,825
East Texas Field	324,000	.....	324,000
Dist. 7-C (West)	39,560	.....	39,560
Dist. 8 (West)	618,230	.....	618,230
Dist. 7-B (W. Central)	39,400	.....	39,400
Dist. 9 (N. Central)	127,525	.....	127,525
Dist. 10 (Panhandle)	83,620	.....	83,620
Wyoming	120,430	122,000	121,610
Total United States	*5,153,960	5,152,000	5,165,175
Change from prev. wk., dn.	11,215		

Total production January 1-August 23 .. †1,167,443,110 bbl.
Same period last year (crude plus cond.) 1,111,983,980 bbl.

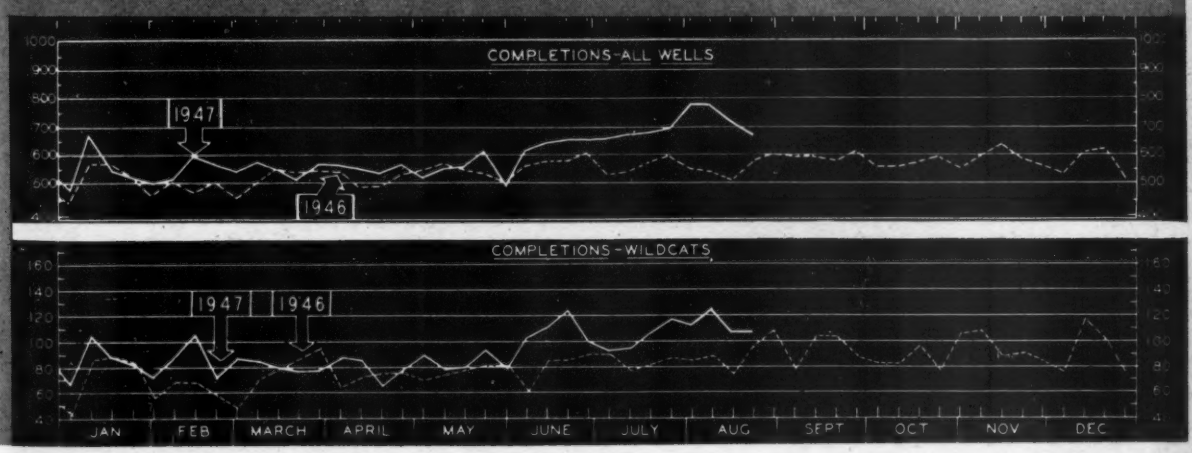
*Not incl. 41,165 bbl. condensate. †Incl. 7,159,385 bbl. condensate.

OIL STOCKS IN THE UNITED STATES



DAILY OPERATIONS

Solid line charts weekly completions, service wells in Eastern area included.



PENBERTHY
AUTOMATIC
INJECTORS

The accepted method for assuring an uninterrupted supply of feed water to oil field boilers. Penberthy Automatic Injectors will supply feed water to boilers at minimum cost, are quickly and easily installed, reliable under most severe operating conditions, require little attention and no careful handling. Highest quality design and rugged construction.

PENBERTHY INJECTOR CO.
DETROIT, MICH. Canadian Plant WINDSOR, ONTARIO

MARKETS

THE petroleum industry this week approached the peak of the summer gasoline-consuming season with an eye ahead toward the problems involved in meeting this winter's demand for heating oil.

The tank-car motor-fuel market continued tight with many suppliers reporting no open spot shipments. Prices of gasoline where available to other than contract accounts generally ranged above 9 cents.

Labor Day is the traditional turning point in petroleum markets, but many suppliers believe gasoline demand will continue heavy long past early September, particularly if the weather remains good. On the consumer side of the gasoline market, isolated instances of limited sales continued to be reported in the north-central section but the industry was generally successful in satisfying the greatest demand for motor fuel in history.

Suppliers were building storage of heating oils for winter when demand is expected to exceed that of this summer. Little No. 2 was available in the Mid-Continent; what moved was at prices of 7¼ cents and higher. No. 6 residual, also tight, was selling at prices ranging upward from $2.15 per barrel, and little change in this product was anticipated.

Natural Gasoline Unchanged

Natural gasoline was unchanged this week at the higher levels reached in the previous week. Quotations were 6⅛ Group 3, and 5⅝ cents North Texas. One major natural-gasoline supplier was reported to be studying ways of allocating equitably available supplies among customers. Officials in the natural-gasoline industry also were closely watching moves being made by the Government to assure military supplies of aviation gasoline, since manufacture of this high-octane commodity requires large quantities of lighter fractions.

In view of current supply conditions, the products market continued to be featured by various inducements offered to obtain material. One marketer commented that "a man with nothing but money doesn't get anything." Tank cars were often specified as a condition of sale. In some cases, exchanges of crude were being made for certain quantities of products. The former "price buyers" were said to be finding it particularly difficult to locate material, since most companies are selling only to old accounts.

Standard Oil Co. (Ind.) announced that it will continue through September and October its present plan of dividing gasoline supplies among dealers and customers. The company in June set up an allocation system limiting deliveries to approximately the total supplied in the correponding months of 1946.

Demand 9 Per Cent Over 1946

An indication of the extent of the current demand for petroleum products was given by figures showing demand in the 5-week period ended August 16 was approximately 9 per cent above the corresponding period in 1946. Gasoline demand throughout the country was running some 9.7 per cent over last year and was estimated at 2,412,000 bbl. daily. In July, filling-station sales were approximately 11 per cent above July 1946 and 4 per cent above June 1947, according to a report of the Bureau of the Census.

Representative Quotations

Representative spot-market quotations of leading suppliers as of August 25, 1947. Figures are f.o.b. plant for tank-car shipment in cents per gallon, except for residual fuel oil which shows the price per barrel and wax, in cents per pound.

GASOLINE, KEROSINE, AND FUEL OILS

	Mid-Continent Group 3	New York Harbor	Texas Gulf Coast
Regular gasoline, 73-75 octane	8.5-9.5	10.3-10.5* 9.3-9.5†	9-10
Premium gasoline, 78-89 octane	9.25-10.25	10.2-12	9.5-10.5
42-44 w.w. kerosine	7.5-7.75	7.8-8.1	7.5-8
No. 2 straw fuel oil	7.25-7.75	6.8-7.2	7.7.5
No. 6 residual	$2.15-2.50	$2.22-2.52	$2.00-2.75

*Branded (74-76 octane); †Unbranded (74-76 octane).

NATURAL GASOLINE

	Group 3	North Texas	N. La.
Grade 26-70	6.125	5.625	5.875
Grade 18-55	7.35	6.75	7.05

LUBRICATING OILS
South Texas

200 vis., No. 2-3 neutral	11.5-12.5
750 vis., No. 3-4 neutral	13.5-15.25
2,000, No. 5-6 neutral	15-16.75

LUBRICATING OILS
Mid-Continent

150-160 vis. D bright stock, 0-10 p.p.	29
200 vis. No. 3 neutral, 0-10 p.p.	18-19

Western Pennsylvania

145-155 vis. 10 p.t. bright stock	45
180 vis. 0 p.t. neutral	43

CRUDE-SCALE WAX
Mid-Continent

130-132 A.S.T.M. melting point	6.75-7.75

EQUIPMENT MEN ... in the News

Detroit Diesel Makes Sales Changes

R. A. HILL

Royce A. Hill has been appointed field sales engineer for the northern section of the Dallas region of Detroit Diesel Engine Division, General Motors Corp. Hill, in his new assignment, will be responsible for

L. H. WELLS

W. C. WRIGHT

all industrial and petroleum distributor's sales activities for the territory which includes Oklahoma, northern Texas, and northern New Mexico. This jurisdiction will also cover the upper part of Louisiana for petroleum sales distribution only. Lauren H. Wells has been assigned as sales engineer for the northern west coast zone and will direct industrial, marine, and petroleum distributors sales in that area. His territory will include Washington, Oregon, and the northern part of Idaho. Victor Hansen will take over the southern west coast zone in a similar capacity with distributors in California, Arizona, and eastern Nevada coming under his jurisdiction. Hensen will make his headquarters at Oakland, Calif. Appointments of Wells and Hansen were made to fill vacancies left by Murrison C. Wright and James R. Williams who have taken over the northern California distributorship franchise for the sale of General Motors marine and industrial diesel engines.

Eastman Buys Oil Field Service Company

Eastman Oil Well Survey Co. has purchased Oil Field Service Co. of California. Of unusual interest in the transaction is the fact that H. John Eastman, president of the Eastman company, entered oil-field work as an employe of Oil Field Service Co. where he worked for 7 years before resigning to organize his own company. Oil Field Service Co. and its former owner, R. D. "Pat" Elliott, are widely known on the Pacific Coast for their work in the modern "water witching" of wells.

Frabimor Represents Leading Manufacturers

Frabimor Equipment & Controls Co., Inc., 5235 West North Avenue, Chicago, organized January 2, 1947, for the purpose of sales and engineering specialization in valves and controls, has been appointed as exclusive representative in the Chicago and Milwaukee areas for: Kieley & Mueller, Inc., North Bergen, N. J.; Continental Equipment Co., Corapolis, Pa.; J. A. Campbell Co., Long Beach; Photoswitch, Inc., Cambridge, Mass.; Wedgeplug Valve Co., New Orleans; Delta Engineering Co., Shreveport; and Newark Boiler Regulator Co., Bloomfield, N. J. Officers of Frabimore Equipment & Controls Co. are: M. C. Waterman, president, formerly with Minneapolis-Honeywell Regulator Co. and McAlear Manufacturing Co.; C. W. Snyder, formerly with the combined operation group known as McAlear Division of General Finance Co.; and Frank T. Bock, secretary-treasurer, who was formerly with Johns-Manville Co., Chapman Valve Co., and 15 years with McAlear Manufacturing Co.

Dana Adds Pughe

Earle W. Pughe, until recently connected with General Motors Corp., has been added to the management staff of Dana Corp. He will have the title of assistant to the executive vice president.

Lee C. Moore Opens Export Office

Announcement has been made by Lee C. Moore Corp. of Pittsburgh and Tulsa of the opening of a company export office in Room 572, at 50 Church Street, New York. George I. Lynch has been appointed manager of this export sales office. He has been located in the company's sales offices in Pittsburgh, Houston, and New York prior to becoming export manager.

Mission Enlarges Plant

Mission Manufacturing Co. is enlarging its plant and increasing its manufacturing facilities to a point that will practically double its present output of principal products. Architecture of the new plant is of the same Spanish Mission design as is the original Mission plant which is unique among industrial plants because of its beauty and because of its setting in a large, appropriately landscaped, deep-verdured lawn.

According to Dudley C. Sharp, president of the company, the quarter-million-dollar expansion program includes a new plating plant for use in the manufacture of its piston rods. Sharp said the demand for these rods with the two wearing surfaces accounts for the extra apportionment of space for this purpose. By the use of new techniques, the Super-Surface is applied over a file-hard surface. An addition to the presen heat-treating plant will house two large automatically controlled fur-

(Continued on page 147)

New warehouse and loading area has just been completed at Mission Manufacturing Co., Houston, manufacturers of oil-field equipment. This is part of a new $235,000 expansion being completed by Mission to allow increased production

Classified Advertising

The Market Place for the Oil Industry

EQUIPMENT FOR SALE

FOR SALE: Six New Kobe, 2½ inch tubing insert, pumps, one Triplex—Bargain for immediate sale. Ben Beckham, Jr., Box 134, Overton, Texas. Phone 3921.

CULVERTS For Sale: 18" corrugated galvanized, sectional culverts. Will make any desired length and sustain heavy loads. Phone 3-9169, Tulsa, Oklahoma.

FOR CABLE TOOLS
DEGEN PIPE AND SUPPLY CO.
Box 107, Red Fork Station, Tulsa, Oklahoma

COMPLETE ELECTRICAL equipment including 300-hp. Allis-Chalmers motor for diesel electric rig. Welsh-Bennett Company, P. O. Box 2963, Odessa, Texas.

ONE SHALLOW rotary rig including Cardwell "L" drawworks; Waukesha GAK engine; Gardner-Denver 7¼" x 10" pump. Welsh-Bennett Company, P. O. Box 2963, Odessa, Texas.

FOR SALE: 60 H.P. slightly used six cylinder Waukesha power units. Fully enclosed with radiator, electric starter and generator. Can furnish with clutch and transmission. P. O. Box 4313, Memphis, Tenn.

COMPRESSOR PLANT FOR SALE

5 Superior 185 HP Engines Ingersoll Compressors 6½ x 20 & 13 x 20

5 Cooper Bessemer 170 H.P. Engines Ingersoll Compressors 6 x 20 & 13 x 20.

Ingersoll Type XVG Starter Engine & Type 48 K & 36K Heads.

Located close to Los Angeles, Calif.
Further particulars from

John McLauchlan
1935 Midwick Drive, Altadena, Calif.
Phone Sycamore 44015.

NEW BOLTED TANKS

15—100 Bbl. Bolted Steel Tanks.

15—250 Bbbl. Bolted Steel Tanks.

15—200 Bbl. High, Bolted Steel Tanks.

15—500 Bbl. Low, Bolted Steel Tanks.

17—1,000 Bbl. High, Bolted Steel Tanks.

All above tanks new, crated for export, with all hardware, gaskets, ladders, etc.

PETROLEUM EQUIPMENT, INC.
P. O. Box 887 Telephone 2-6291
Tulsa, Oklahoma

FOR QUICK DELIVERY

2—84' Pumping Derricks
2—84' A-1 Drilling Derricks (with or without rig fronts)
3—Parkersburg 6" Chain Drive Rig Fronts, with or without engines, beams, etc.
1—Bethlehem Twin Crank pumping unit, with or without engine, enginehouse, etc.
1—Parkersburg 11' Pumping Unit converted to 72" conventional type, with or without twin vertical Webber Gas engines: 30 H.P. to 100 H.P. Twins.
1—National Gearbox with back-stroke equipment.

OKMULGEE SUPPLY CORP.
Okmulgee, Okla.

EQUIPMENT FOR SALE

3500 BBL. REFINERY, topping and cracking, also 40,000 bbls. heavy steel storage. One Ingersoll-Rand XOG #10 compressor with starting motor. Two Cooper-Bessemer 80 H.P. Engines with starting motor. Write Box 271, Tyler, Texas.

1 STAR 45 ST Spudder with Hercules engine. Both in excellent condition. No tools. Located 10 miles East of Drumright, Okla. 1 Ft. Worth Super D Spudder with practically two strings of tools, located on Lysite Mountain, Wyoming. Travco Equipment Company, 110 Midco Bldg., Tulsa, Oklahoma. Phone 5-2251.

FOR SALE: Model K Cardwell, perfect condition w/5" & 7" tools complete. Morris & Son, Box 107, Carmi, Illinois.

FOR SALE: New Brewster Draw Works, 60-B Skid Mounted complete with Mast, Table and 6-SREU Waukesha $10,000.00. Box B-872, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE

1—Franklin valveless 16 x 16 type OF engine.

3—40 hp. 2-cycle EC enclosed type Bessemer gas engines with 12 x 18 cylinders.

6—25 hp. Superior engines, 4 cycle type OC.

3—20 hp. OCS Bat transmission unit.

BANKOFF PIPE & SUPPLY COMPANY
823 N. Lewis
Tulsa, Oklahoma

FOR SALE

1—Ditching Machine, Model 46, Buckeye, 6' Cutting Depth, 42" Wide, Gasoline Driven, Serial #3690.
1—Ditching Machine, Model 48, Buckeye, 8' Cutting Depth, 42" wide, Gasoline Driven, Serial #3776.
1—Backhoe, Buckeye Model 70, 35' Crane Boom, Fairlead Dragline, ¾ yd. Bucket ¾ yd. Trench Hoe, Motor #14414, Serial #C-36-520.
1—Tractor, RD-8 Caterpillar, Model B5-620, Serial #1H1508 with Berg Sideboom, Serial #475.

Above Equipment Available for Inspection

MORRISON BROS. CONSTRUCTION COMPANY, Inc.
P. O. Box 1000 Phone 414
Glasgow, Kentucky

EQUIPMENT FOR SALE

FOR SALE: Shaffer power draw works, powered by two J. L. 1335 Buda engines compounded. Suitable for 5,000 foot work. In A-1 condition. Price $7,500. Terms. Melton Well Service, Box 1360, Seminole, Oklahoma.

FOR SALE

Approximately 18,000 ft. of 14" OD spiral weld line pipe located near Fittstown, Okla. Call or wire

MORAN PIPE & SUPPLY COMPANY
804 Ritz Bldg. Ph. 3-3595
Tulsa, Oklahoma

NEW PUMPS FOR SALE

New Gaso Fig. #1860—4½" x 6" with engines—3"—2 Stage Byron Jackson with and less engines—Hale Chrysler Fire Pumps with engines—Aurora Model AD2 with engines—Lombard Fig. #1684 with engines—Novo Model KH2 with engines.

Write for Specifications and Prices

H. A. McCARTHY
310 Thompson Bldg. Phone 5-3296
Tulsa, Oklahoma

SPECIAL OFFERING—PUMPS

3—"Barnes" 3" centrifugal self-priming pumps, Model 20M, each has capacity of 325 GPM of water developing 25 ft. total head including 10 ft. suction lift. Driven by direct connected Wisconsin air-cooled, single cylinder, four cycle, gasoline engine, Model AHH. Speed 2200 RPM Brake H.P. at rated capacity and head is 7.5. Pump is bronze fitted and has a stainless shaft sleeve. Unused and export crated. Complete. Each pump having set spare parts. Mounted on steel wheels.

PETROLEUM EQUIPMENT, INC.
P. O. Box 887 Telephone 2-6291
Tulsa, Oklahoma

SHOT HOLE DRILLS

Large and Small

All are truck mounted, rotary, chain pull down, smallest pump size 4 x 6. Some are in excellent condition; others need repair. Price F.O.B. Dallas, from $3,000 to $8,000, including truck.

For details write

8800 LEMMON AVENUE, DALLAS, TEX.

NEW TANK TRAILERS

2,000 Gallon Capacity

2-Compartment

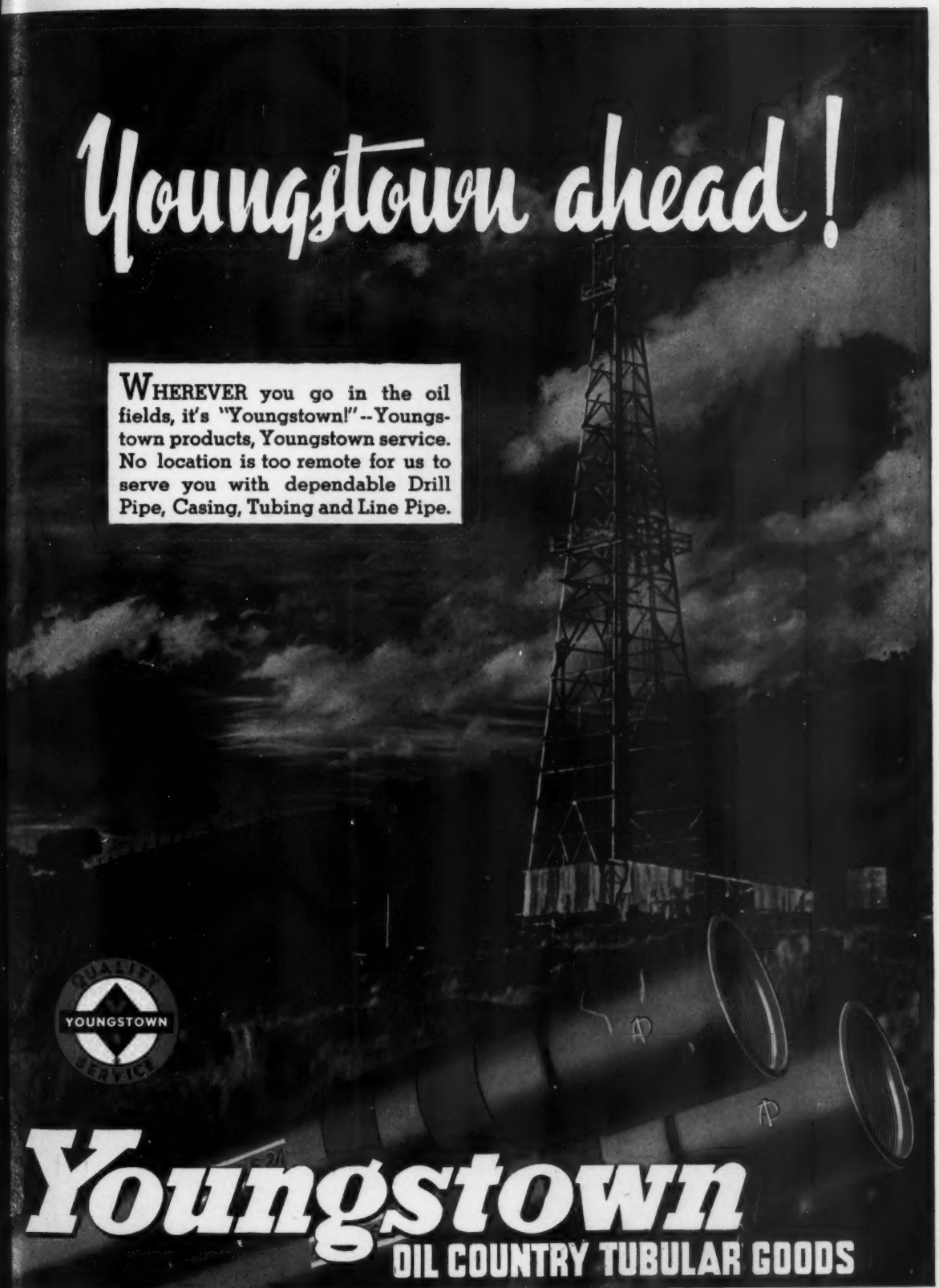
With gasoline powered pump, discharge hose, squeeze nozzle, 9.00 x 20 dual rear pneumatics, air brakes, landing gear, with or without front dolly.

Also

New 1350-gallon, 2-compartment truck tanks on 6x6 G.M.C. chassis complete with hand or power pumping equipment, etc.

L. B. SMITH, INC.
Camp Hill, Pa. Phone Harrisburg 7331

Youngstown ahead!



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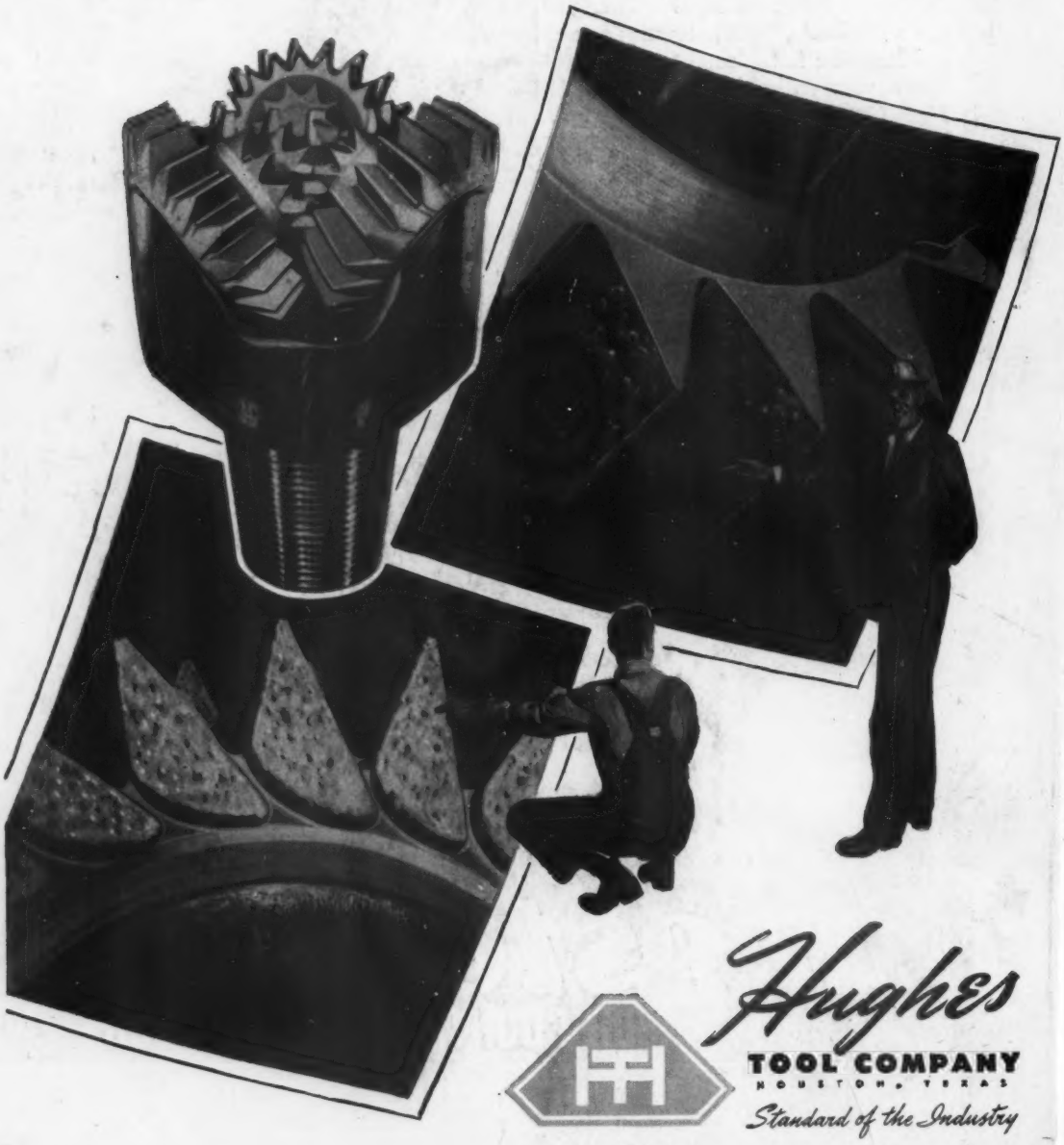

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